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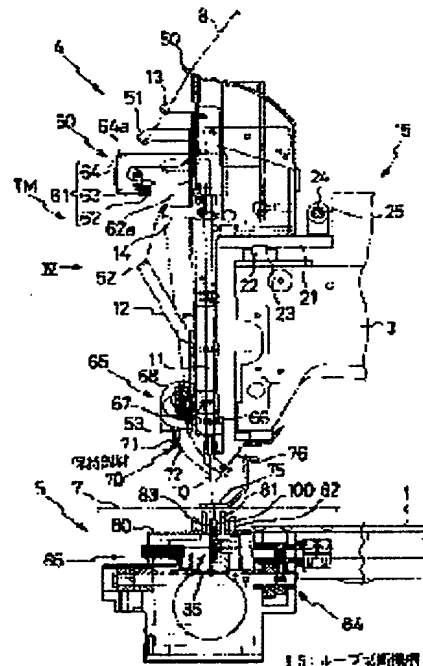
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(54) TUFTING MACHINE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a tufting machine that can attain easy formation of tufting various patterns, has a simplified machine structure and can realize the steady motion for the tufting pattern formation.

SOLUTION: The tuft machine TM is equipped with a plurality of needle bars 11, the needle bar case 12 for supporting these needle bars 11, the needle barswitching mechanism that drives and moves the needle bar case 12 to select the needle bar 11 selected from a plurality of the needle bars 11 and switch to the employing position corresponding to the looper 83 in an alternative way. In addition, the tufting machine is equipped with the loop-cutting mechanism 85 for cutting a yarn loop, every time the yarn loop is formed, and the position height-adjusting mechanism 86 for adjusting the height of the needle plates 80.



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(57)【要約】

【課題】多種多彩なタフト模様を容易に形成可能にするとともに、構造を簡単化し、確実なタフト模様形成動作を実現し得るタフトミシンを提供する。

【解決手段】タフトミシンTMIは、複数の針棒11、これら針棒11を支持する針棒ケース12、針棒ケース12を移動駆動して複数の針棒11のなかから選択された針棒11をルーパ83と対応する使用位置に択一的に切換える針棒切換え機構15を備えている。また、1つの糸ループを形成する毎にその糸ループを切断するループ切断機構85、針板80の高さ位置を調節可能な高さ位置調節機構86等が設けられている。

詳細な説明

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明はタフトマシンに関し、特に、糸色等が異なる複数種々の糸を使用して、基布に多種多彩なタフト模様を形成可能にしたタフトマシンに関する。

【0002】

【従来の技術】 従来のタフトマシンは、基本的に、上下駆動される縫針と、上下動する縫針に同期して揺動駆動されその縫針から延びる糸を捕捉するルーパを備え、これら縫針とルーパの協働により、針板の上側に支持されて布送りされる基布の下側に多数の糸ループが形成される。更に、従来のタフトマシンの多くは、ルーパを含むループ切断機構を設け、このループ切断機構により、多数の糸ループが切断され多数のカットパイルが形成される。

【0003】従来のタフトマシンとして、縫針が1本の単針式のタフトマシンと、縫針が複数本の多針式のタフトマシンが実用に供されている。一般的な多針式のタフトマシンは、基布の送り方向と直交する水平方向に並設された複数の縫針と、これら縫針に対応する複数のルーパを備え、布送りされる基布に、糸ループ(カットパイル)をある幅(複数の縫針を並設した幅)一斉に形成していくことができる。

【0004】その他の多針式のタフトマシンとしては、特公平6-35701号公報に、独立に上下駆動される複数の縫針と、これら縫針に対応する複数のルーパを備え、複数の異色の糸を使用して、基布に多数のカットパイルからなる多種多彩なタフト模様を形成可能にしたタフトマシンが開示されている。

【0005】このタフトマシンには、縫針を夫々装着した複数の針ホルダと、これら針ホルダを上下移動可能に保持する保持部材と、複数の針ホルダに近接状に配設された共通の可動部材と、この可動部材を上下駆動する上下駆動機構と、可動部材と複数の針ホルダを夫々連結解除可能に連結する複数のエアシリンダからなる連結機構と、保持部材と可動部材を基布の送り方向と直交する水平方向に移動駆動する水平駆動機構等が設けられている。

【0006】選択された縫針を装着した針ホルダがエアシリンダにより上下可動体に連結され、この状態で、上下駆動機構により可動部材とともにそれに連結された縫針(針ホルダ)が上下駆動され、対応するルーパと協働して糸ループを形成する。その際、基布が送られるとその布送り方向に糸ループ(カットパイル)が形成され、また、水平駆動機構により保持部材と可動部材が布送り方向と直交する水平方向に移動駆動されると、その布送り直交方向に糸ループが形成される。尚、糸ループを形成する為に縫針を布送り直交方向に移動させると、その縫針に対応するルーパも同方向に移動させる必要がある。

【0007】また、一般的なタフトマシンにおいて、カットパイルを形成する場合、ルーパが複数の糸ループ(例えば、3つ)を捕捉している状態で、基布が送られて新たに1つの糸ループを捕捉する毎に、ルーパに捕捉されているなかで最初に捕捉された糸ループを、ループ切断機構のルーパと下メスで切断してカットパイルを形成する。尚、特開平5-222660号公報に、1つの糸ループを形成する毎に、その糸ループをループ切断機構が切断する技術が開示されているが、縫針を複数設ける場合は、その各縫針1本毎にルーパとナイフとを組にして設けることが示されているので、装置が大掛かり且つ複雑になる。

【0008】従来、カットパイルの長さを調節する場合には、可動部材に止めネジ等で固定されたルーパの取付け位置を変更し、針板とルーパの糸切断部との距離を変更することにより行っている。これに対して、特開昭52-74455号公報に、エアシリンダにより、針板の下面にカム面が当接するカムを回動して針板を上下動させて、針板とルーパの糸切断部との距離を変更し、カットパイルの長さを調節する技術が開示されている。

【0009】他方、特公平1-57177号公報には、複数の縫針が駆動停止している状態で、エアシリンダにより駆動される糸把持具により、複数の縫針へ夫々延びる複数の糸の途中部を一括して解放可能に把持し、これら糸の先端部のカットパイルが基布から抜けないようにした技術が開示されている。

【0010】尚、一般的な多針式マシンにおいては、複数の縫針から延びる複数の上糸を夫々保持する複数のクリップ等の保持部材を設けたものが多い。これに対して、特開平5-253377号公報の多針式マシンに、複数の保持部材の代わりに、1つの保持部材として密に巻かれたコイルバネを設け、このコイルバネに複数の上糸を夫々挾持させる技術が開示されている。

【0011】ここで、糸ループ及びカットパイルの形成動作について説明すると、縫針が基布に上側

棒ケースが移動駆動されて、複数の針棒のなかから選択された針棒が使用位置に択一的に切換えられる。針棒切換え機構による針棒切換え後、使用位置の針棒とルーパが駆動されて、その針棒とともに上下動する縫針から延びる糸がルーパにより捕捉され、針板の上側に支持されて布送りされる基布の下側に糸ループが形成される。尚、ルーパ切断機構を設けることにより、糸ループを切断してカットパイルを形成することができる。

【0021】前記複数の針棒、針棒ケース、針棒切換え機構を設けることにより、複数の縫針に糸色等が異なる複数種類の糸を装着して使用することができ、これら複数種類の糸のうち、現在使用している(選択されている)糸から次に使用する(選択された)所望の糸に針棒及び縫針ごと簡単に切換えることができる。つまり、使用する糸の色替え毎に、面倒で煩雑な糸交換作業を行う必要がなくなるため、糸交換の為の作業負担を軽減し作業能率を高めることができる。

【0022】そして、基布の送り動作と、針棒切換え機構による針棒の切換え動作と、使用位置の針棒(縫針)とルーパによる糸ループ形成動作等を、種々の設定パターンにより実行させることにより、基布に多数の糸ループやカットパイルからなる多種多彩なタフト模様を容易に形成することが可能になる。しかも、複数の縫針(針棒)に対してそれらに共通の1つのルーパを設けるだけでよく、しかも、使用位置の1本の針棒だけを上下駆動する針棒駆動機構を設けるだけでよいため、部品点数の増大を抑えて構造を簡単且つ小型化でき製作コスト的に有利になる。

【0023】請求項2のタフトマシンは、請求項1の発明において、多数の糸ループを切断して多数のカットパイルを形成するループ切断機構を設け、このループ切断機構は、1つの糸ループを形成する毎にその糸ループを切断するように構成されたことを特徴とするものである。ルーパに捕捉された糸ループに拘束されずに、基布を任意方向に任意ピッチで自由自在に且つ所望の速度で送りながら、糸ループとカットパイルを形成していくことができる。つまり、基布に多種多彩なタフト模様を形成するうえで非常に有効になる。

【0024】請求項3のタフトマシンは、請求項2の発明において、前記針板の高さ位置を調節可能な高さ位置調節機構を設け、この高さ位置調節機構により針板とルーパの糸切断部との距離を変更しカットパイルの長さを調節することを特徴とするものである。カットパイルの長さを簡単に調節することができ、基布に種々の長さのカットパイルからなるタフト模様を容易に形成することが可能になる。

【0025】請求項4のタフトマシンは、請求項3の発明において、前記高さ位置調節機構は手動ダイヤルを備え、その手動ダイヤルの操作により針板を上下動させるように構成したことを特徴とするものである。手動ダイヤルの操作により、針板の高さ位置、つまりカットパイルの長さを簡単に調節することができる。また、針板を高さ位置を無段階に調節可能にするとともに、その微調節を簡単にできるようにすることができる。

【0026】請求項5のタフトマシンは、請求項3の発明において、前記高さ位置調節機構は針板を上下駆動可能なアクチュエータを備え、このアクチュエータをタフト模様形成データに基づいて駆動制御して、針板を上下動させることを特徴とするものである。タフト模様形成データに基づいてアクチュエータを駆動制御して、針板の高さ位置を自動的に調節することができる。つまり、種々の長さのカットパイルからなるタフト模様の形成動作を連続的に行えるようになるため、生産性が向上する。

【0027】請求項6のタフトマシンは、請求項1～5の何れか1項の発明において、前記複数の縫針のうち休止中の複数の縫針から延びる糸の端部付近を夫々解除可能に保持する保持部材を設けたことを特徴とするものである。休止中の複数の縫針から延びる糸の端部付近を保持部材に夫々保持できるため、これら糸の端部付近がからまったり邪魔になったりするのを防止できる。

【0028】請求項7のタフトマシンは、請求項1～6の何れか1項の発明において、複数の糸供給源から複数の縫針に夫々延びる糸の途中部を解放可能に挟持する糸挟持機構を設け、前記縫針から延びる糸をルーパが捕捉するタイミングと略同時に、糸挟持機構により糸を挟持することを特徴とするものである。縫針の上下動により、糸供給源から針先側へ糸が過剰に繰出されるのを防止することができる。

【0029】請求項8のタフトマシンは、請求項1～7の何れか1項の発明において、各縫針の針孔の上側部位に、ルーパが糸を捕捉する際に通るルーパ導入凹部を形成したことを特徴とするものである。特に、太い糸が使用される場合でも、ループ導入凹部に導入されるループで糸を確実に捕捉して糸ループを形成できる。

【0030】

【発明の実施の形態】以下、本発明の実施の形態について図面を参照しながら説明する。本実施形態は、図19に示すように、基布7に糸ループ8aを形成しながら、図20に示すように、その糸ル

は、常時、針上位置に位置している。上下可動体45が上限位置のとき、その係合部47aが針上位置の針棒11の係合ピン48と係合可能な高さ位置になる。

【0041】つまり、上下可動体45を上限位置に位置させた状態で、針棒切換え機構15により、針棒ケース12を移動駆動し、複数の針棒11のなかから選択された針棒11を使用位置に択一的に切換えると、その使用位置の針棒11の係合ピン48が上下可動体45の係合部47aに係合連結し、針棒駆動機構16により使用位置の針棒11を上下駆動することができる。

【0042】ここで、針棒駆動機構16により上下駆動されている針棒11と1対の糸掛け部材13、14を停止させる時、駆動停止しても惰性により作動する針棒駆動機構16と針棒11との連結を瞬時に解除してその上下駆動を停止させる為の針棒天秤ジャンプ機構49が設けられている。この針棒天秤ジャンプ機構49はソレノイドアクチュエータを有し、そのソレノイドアクチュエータにより第2可動部材47を所定角度(例えば、90度)以上回動させることにより、第2可動部材47の係合部47aと針棒11の係合ピン48との係合を解除して、針棒駆動機構16から針棒11への動力伝達を遮断するとともに、圧縮コイルバネ11aの弾性付勢力により針棒11を1対の糸掛け部材13、14とともに針上位置にジャンプさせる。

【0043】図2～図4に示すように、針棒ケース12の前面側には、複数の糸案内部材50～53が固定的に設けられ、糸供給装置19からの延びる各糸8は、糸案内部材50、糸掛け部材13、糸案内部材51、糸案内部材52、糸掛け部材14、糸案内部材53の順に糸掛けしてから縫針10に導かれる。

【0044】ところで、針棒ケース12には、天秤装置60と、糸供給装置19の複数の糸駒9(糸供給源)から複数の縫針10に夫々延びる糸8の途中部を解放可能に挟持する糸挟持機構65と、複数の縫針10のうち休止中の複数の縫針10から延びる糸8の端部付近を夫々解除可能に保持する保持部材70が設けられている。

【0045】天秤装置60は、図2～図4に示すように、各針棒11に固定された上下1対の糸掛け部材(上側糸掛け部材13と下側糸掛け部材14)と、針棒支持体である針棒ケース12に固定的に設けられた上下1対の糸案内部材(上側固定糸案内部材51と下側固定糸案内部材52)と、上側固定糸案内部材51から下側固定糸案内部材52へ延びる複数の糸8の途中部を解放可能に挟持する天秤用糸挟持機構61を備えている。

【0046】固定糸案内部材51、52の前端の糸案内内部同士は同じ前後位置に位置し、糸掛け部材13、14の前端の糸案内内部同士も同じ前後位置に位置し、固定糸案内部材51、52の糸案内内部は糸掛け部材13、14の糸案内内部より前側に位置している。図2は糸掛け部材13、14(針棒11)が上限位置にある状態を示し、図3は糸掛け部材13、14が下限位置にある状態を示している。これらの図から判るように、上側糸掛け部材13の上下移動領域の間の中央位置付近に上側固定糸案内部材51の糸案内内部が位置し、下側糸掛け部材14の上下移動領域の間の下端位置付近に下側固定糸案内部材52の糸案内内部が位置するように構成されている。

【0047】天秤用糸挟持機構61は、針棒ケース12に固定されたブラケット62aの前端部に設けられた左右に長い帯板状の固定側挟持部材62と、固定側挟持部材62の前側に配設された可動側挟持部材63と、針棒ケース12の左側に取付け板64aを介して固定的に設けられたソレノイドアクチュエータ64を有する。両挟持部材62、63は針棒ケース12と略同じ左右長を有し、両挟持部材62、63の間を、上側固定糸案内部材51から下側固定糸案内部材52へ延びる複数の糸8が通っている。

【0048】可動側挟持部材63は、固定側挟持部材62に糸8を押圧可能な押圧板部63aと、押圧板部63aと直交状に一体形成された連結板部63bを有する。連結板部63bの右端部分が屈曲して針棒ケース12の側部に枢支され、連結板部63bの左端部がソレノイドアクチュエータ64に連結されている。ソレノイドアクチュエータ64により可動側挟持部材63が揺動駆動され、上側固定糸案内部材51から下側固定糸案内部材52へ延びる糸8の途中部を両挟持部材62、63で挟持する挟持動作と解放する解放動作を行うことができる。尚、固定側挟持部材62の前面部と可動側挟持部材63の後面部の少なくとも一方を、ゴム製部材を取付けて構成してもよい。

【0049】糸挟持機構65は、図2～図4、図7に示すように、糸案内部材53の上部前面に固定された左右に長い帯板状の固定側挟持部材66(例えば、ゴム製の部材からなる)と、固定側挟持部材66の前側に配設された可動側挟持部材67と、針棒ケース12の左側に固定的に設けられたソレノイドアクチュエータ68を有する。両挟持部材66、67は針棒ケース12と略同じ左右長を有し、両挟持部材66、67の間を糸案内部材53へ至る複数の糸8が通っている。

【0050】可動側挟持部材67は、固定側挟持部材66に糸8を押圧可能な押圧板部67aと、押圧板部67aと直交状に一体形成された連結板部67bを有する。連結板部67bの右端部分が屈曲し

3a形成され、その捕捉部83aの基端部に、糸切断部として刃83bが形成されている。

【0061】8本のピン81、82は、布押え75と対向状に設けられその布押え75とともに基布7を挟持する2本の布押えピン81を含み、その2本の布押えピン81は、矩形孔88の左右方向中央位置において矩形孔88を挟んで前後に設けられ、残り6本のピン82は、矩形孔88の周辺において疎らになるようにして、前後及び左右に略対称に設けられている。

【0062】図12に示すように、布押えピン81の上端部はルーパ83よりも高い位置にあり、布押えピン81以外のピン82の上端部は糸ループ8aを切断する際のルーパ83の刃83bよりも高い位置にある。複数のピン81、82のうち布押えピン81の高さはその他のピン82よりも高く、これにより、基布7が針板80の上側において布押えピン81の上端部に支持されて、その布押えピン81と布押え75により基布7を挟持可能になる。

【0063】図10～図12に示すように、ルーパ駆動機構84は、モーターにより上軸40と同期させて回転駆動される下軸90と、下軸90の回転によりギア91、92を介して回転駆動される駆動軸93と、針板80の下側に設けられ連動連結されたカム94、二股95、リンク96、カラー連結部材97、カラー98、ルーパ土台99を有し、ルーパ土台99にルーパ83が取付けられている。

【0064】カム94は駆動軸93に外嵌固着され、そのカム94に枢支軸95aに枢支された二股95が係合している。二股95とカラー連結部材97がリンク96により連結され、このカラー連結部材97が、駆動軸93に回転自在に外嵌されたカラー98に外嵌固着され、同じカラー98にルーパ土台99も外嵌固着されている。そして、このルーパ駆動機構84により、駆動軸93とともにカム94が矢印方向(図12参照)に1周回転駆動されるとルーパ83が左右に1往復揺動駆動される。

【0065】ループ切断機構85は、ルーパ駆動機構84に共通の下軸90及び駆動軸93と、針板80の下側に設けられ連動連結されたカム101、二股102、メス土台103を有する。カム101は駆動軸93に外嵌固着され、そのカム101に二股102が係合され、その二股102にメス土台103が連動連結され、駆動軸93とともにカム101が矢印方向に1周回転駆動されると下メス100が1往復駆動される。

【0066】高さ位置調節機構86は、図13に示すように、手動ダイヤル115を備え、その手動ダイヤル115の操作により、針板80とともに複数のピン81、82を上下動させるように構成してある。即ち、針板80には、複数の縦向きガイドロッド117,118の上端部が固定され、これらガイドロッド117,118が針板80の下部の針板支持体116に挿通状にガイドされている。手動ダイヤル115に連動連結されたネジ115aが針板80に螺合され、これにより、手動ダイヤル115を回転させることでネジ115aも回転して、針板80が上下動する。これにより、針板80つまり基布7を支持する布押えピン81の上端部とルーパ83の刃83bとの距離を変更しカットパイル8bの長さを調節することができる。

【0067】ここで、図14に示すように、各縫針10の針孔10aの上側部位に、ルーパ83が糸8を捕捉する際に通るルーパ導入凹部10bが形成されている。太い糸8を使用可能に各縫針10の針径は太く、その縫針10の針孔10aの上側部位を深く切欠いてルーパ導入凹部10aが深く大きく形成されている。尚、図示省略したが、このタフトマシンTMには、基布7を任意の水平方向に布送り可能な布送り機構が設けられており、その布送り機構は、例えば、基布7を着脱自在に装着した可動部材を介して、基布7を布押えピン81の上面に略接触させるように送る機構に構成されている。

【0068】次に、糸供給装置19について説明する。図1、図15に示すように、脚柱部2とアーム部3の上側に糸駒9を載置可能な載置板110が固定され、この載置板110に立設された複数の糸立棒111に複数の糸駒9が装着されている。載置板110の後部には棒状部材112が立設され、その棒状部材112に、前後に並ぶ3つの糸案内体120～122が固定的に連結されている。また、載置板110前部側に別の棒状部材115が立設され、その棒状部材115に、糸案内体120から針棒ケース12に向く斜め方向に並ぶ3つ糸案内体125～127が連結されている。

【0069】糸案内体120～122は略同様の構造であり、これらに共通で左右に所定間隔あけて配設された前後向きの複数の連結部材130に連結されるとともに、夫々、左右方向向きの1対の棒部材131,132とコイル133を有する。各糸案内体120～122において、上側の棒部材131がコイル133を挿通するようにして、両棒部材131,132によりコイル133が挟持され、この状態で、これら棒部材131,132が連結部材130に挿通状に支持されている。各糸駒9から上方へ延びる糸8は、3つの糸案内体120～122の適当な1つを使用して糸掛けされ、その際、糸8をコイル133の適当な位置のコイル間において棒部材131に掛けて、糸案内体125側へ導く。尚、糸8をコイル133に通すようにして装着してもよい。

【0070】各糸案内体125～127は略同様の構造であり、これらに共通で左右に所定間隔あけて

ュエータにより、針板80の高さ位置を調節するように構成してもよい。

【0080】また、図22に示すように、前記縫針10の代わりに、針孔10aの上側部位を、前記縫針10の場合よりも浅く切欠くとともに、その切欠いた部位の下側に針幹の側面よりもごく僅かな寸法だけ側方へ突出する突起部10cを形成して、ルーパ83が糸8を捕捉する際に通るルーパ導入凹部10dを形成した縫針10Aとしてもよい。これにより、あまり太くない縫針10にルーパ導入凹部10dを比較的大きく深めに形成することができる。また、図示していないが、縫針の針幹をやや太めにしてその縫針の針孔の上側部位を深く切欠き、しかも、その下側部位に前記突起部10cと同様に側方へ突出する突起部を形成してもよい。これにより、より太い糸8を使用する際のルーパ導入凹部を形成するうえで有効になる。

【0081】尚、本発明の趣旨を逸脱しない範囲で、前記実施形態に種々の変更を付加した形態で実施することも可能である。

【0082】

【発明の効果】請求項1のタフトマシンによれば、縫針が夫々装着された複数の針棒、これら針棒を支持する針棒ケース、針棒ケースを移動駆動して複数の針棒のなかから選択された針棒をルーパと対応する使用位置に択一的に切換える針棒切換え機構を設けたので、複数の縫針に糸色等が複数種類の糸を装着して使用することができ、これら複数種類の糸のうち、現在使用している糸から次に使用する所望の糸に針棒及び縫針ごと簡単に切換えることができる。つまり、使用する糸の色替え毎に、面倒で煩雑な糸交換作業を行う必要がなくなるため、糸交換の為の作業負担を軽減し作業能率を高めることができる。

【0083】基布の送り動作と、針棒切換え機構による針棒の切換え動作と、使用位置の針棒とルーパによる糸ループ形成動作等を、種々の設定パターンにより実行させることにより、基布に多数の糸ループやカットパイルからなる多種多彩なタフト模様を容易に形成することが可能になり、しかも、複数の縫針に対してそれらに共通の1つのルーパを設けるだけでよく、しかも、使用位置の1本の針棒だけを上下駆動する針棒駆動機構を設けるだけでよい。ため、部品点数の増大を抑えて構造を簡単且つ小型化でき製作コスト的に有利になる。

【0084】請求項2のタフトマシンによれば、ループ切断機構により、1つの糸ループを形成する毎にその糸ループを切断するため、ルーパに捕捉された糸ループに拘束されずに、基布を任意方向に任意ピッチで自由自在に且つ所望の速度で送りながら、糸ルーパとカットパイルを形成していくことができる。つまり、基布に多種多彩なタフト模様を形成するうえで非常に有効になる。

【0085】請求項3のタフトマシンによれば、針板の高さ位置を調節可能な高さ位置調節機構により、針板とルーパの糸切断部と距離を変更しカットパイルの長さを簡単に調節することができる。基布に種々の長さのカットパイルからなるタフト模様を容易に形成することが可能になる。

【0086】請求項4のタフトマシンによれば、高さ位置調節機構に設けられた手動ダイヤルの操作により針板を上下動させ、針板の高さ位置、つまりカットパイルの長さを簡単に調節することができる。また、針板を高さ位置を無段階に調節可能にするとともに、その微調節を簡単に行えるようにすることができる。

【0087】請求項5のタフトマシンによれば、高さ位置調節機構に設けられたアクチュエータをタフト模様形成データに基づいて駆動制御して、針板を上下動させその高さ位置を自動的に調節することができ、種々の長さのカットパイルからなるタフト模様の形成動作を連続的に行えるようになるため、生産性が向上する。

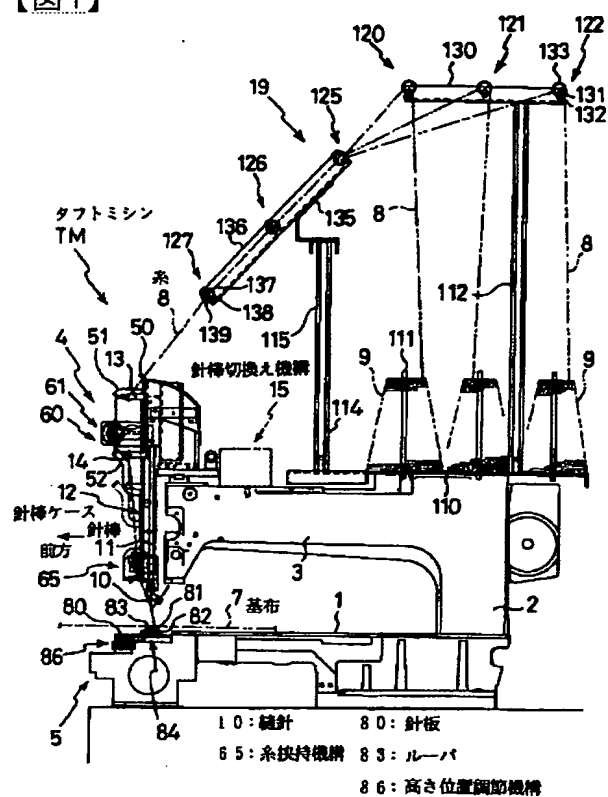
【0088】請求項6のタフトマシンによれば、複数の縫針のうち休止中の複数の縫針から延びる糸の端部付近を夫々解除可能に保持する保持部材を設けたので、これら糸の端部付近がからまつたり邪魔になったりするのを防止できる。

【0089】請求項7のタフトマシンによれば、複数の糸供給源から複数の縫針に夫々延びる糸の途中部を解放可能に挟持する糸挟持機構を設け、前記縫針から延びる糸をルーパが捕捉するタイミングと略同時に、糸挟持機構により糸を挟持するので、縫針の上下動により、糸供給源から針先側へ糸が過剰に繰出されるのを防止することができる。

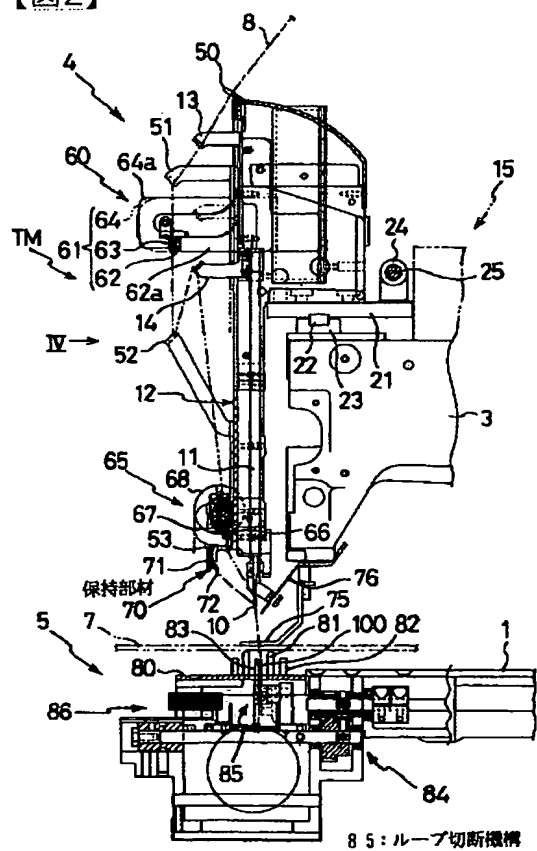
【0090】請求項8のタフトマシンによれば、各縫針の針孔の上側部位に、ルーパが糸を捕捉する際に通るルーパ導入凹部を形成したので、特に、太い糸が使用される場合でも、ルーパ導入凹部に導入されるループで糸を確実に捕捉して糸ループを形成することができる。

図面

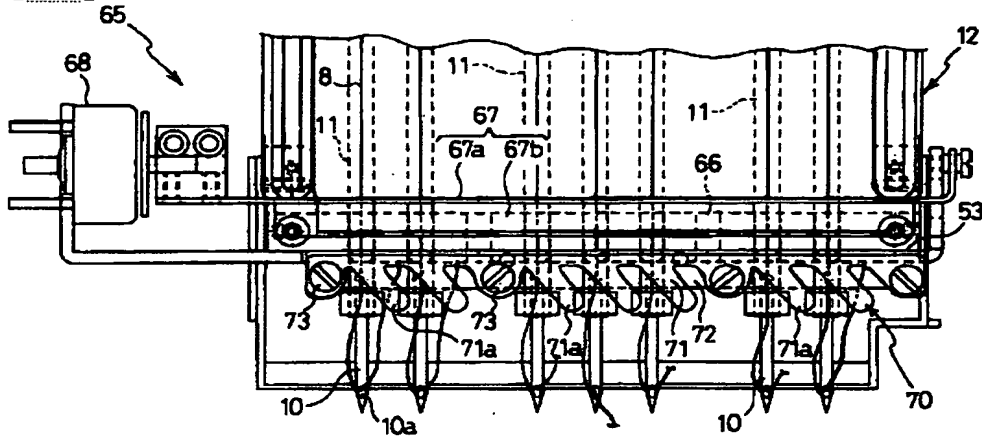
【図 1】



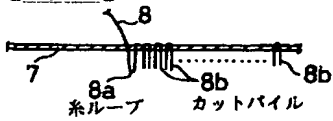
【图2】



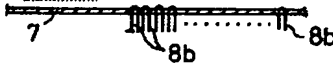
【図7】



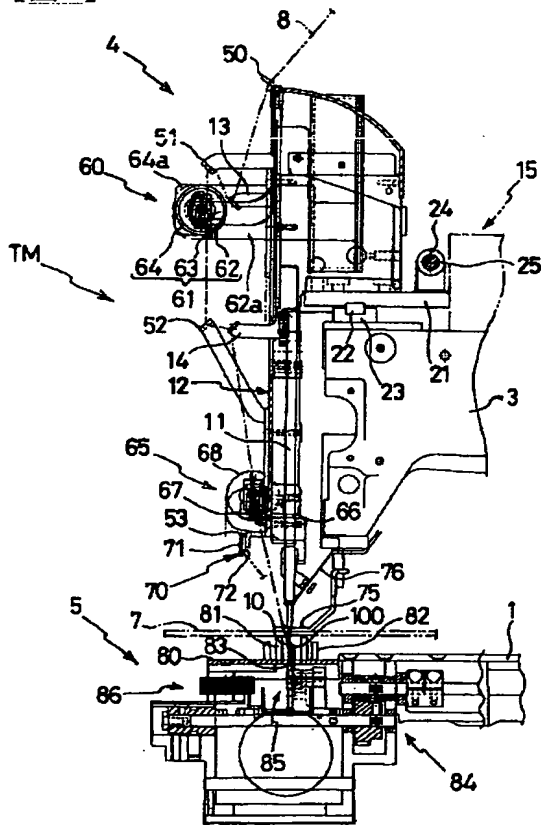
【図19】



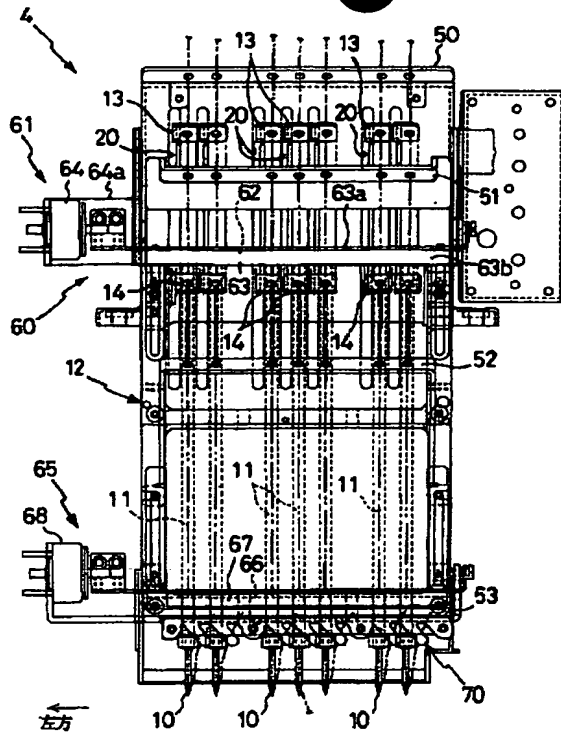
【図20】



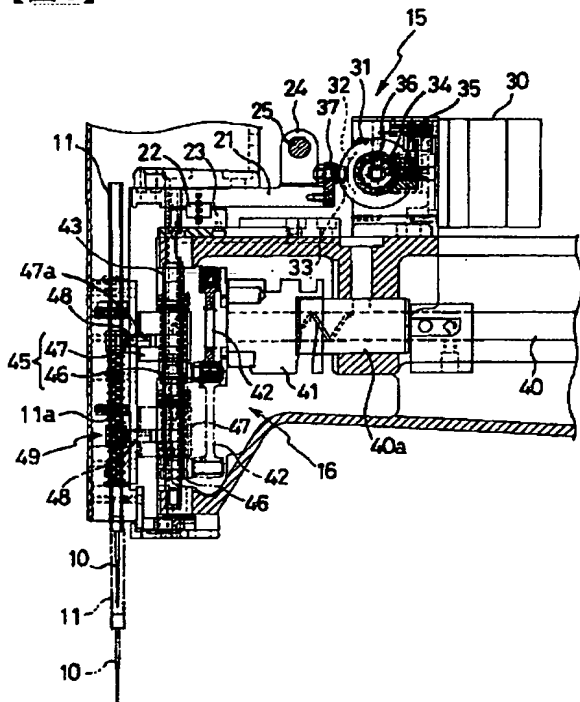
【図3】



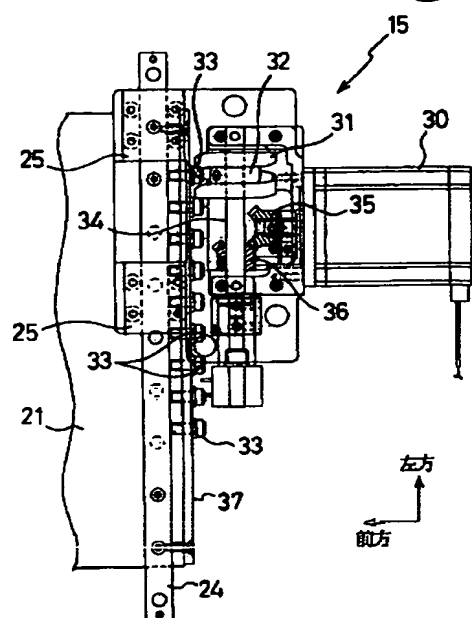
【図4】



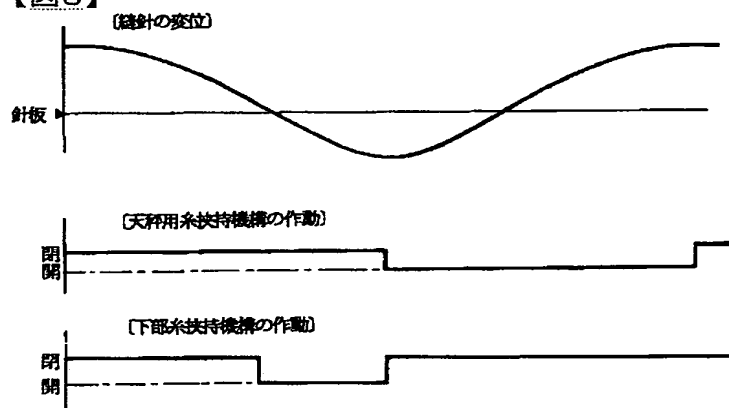
【図5】



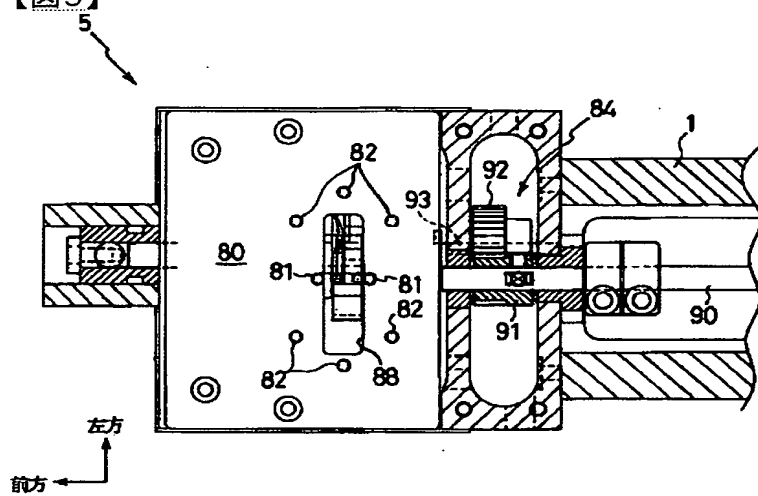
【図6】



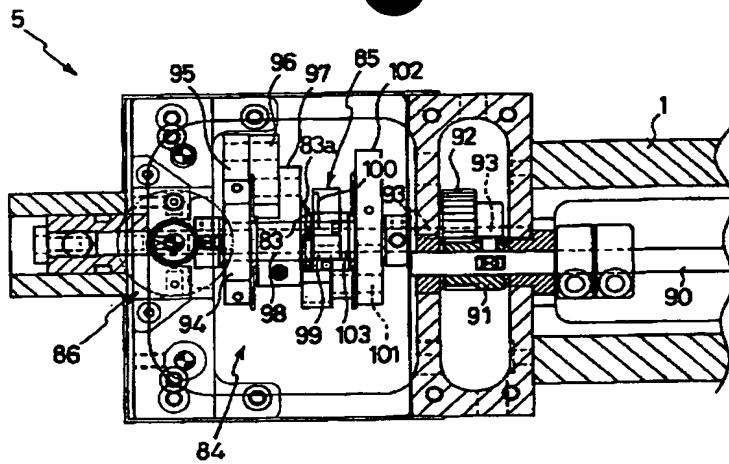
【図8】



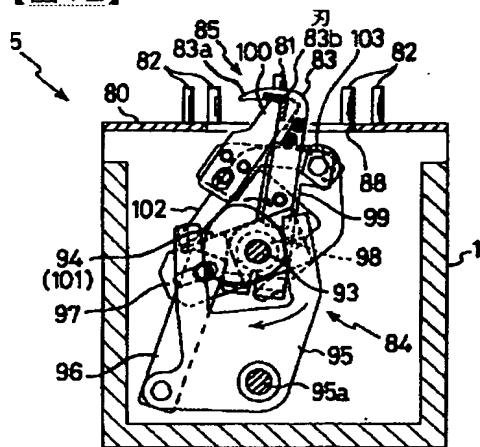
【図9】



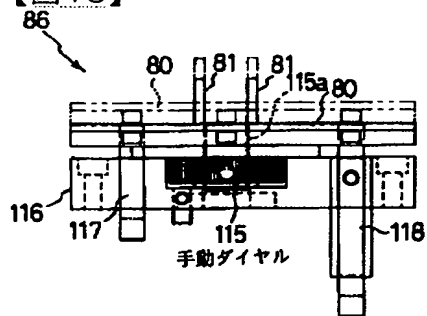
【図10】



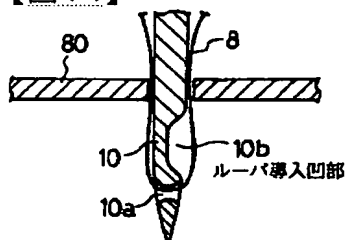
【図12】



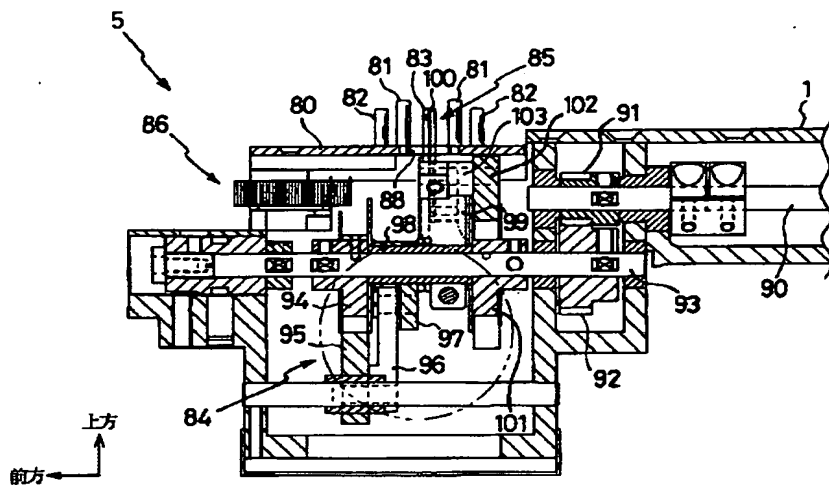
【図13】



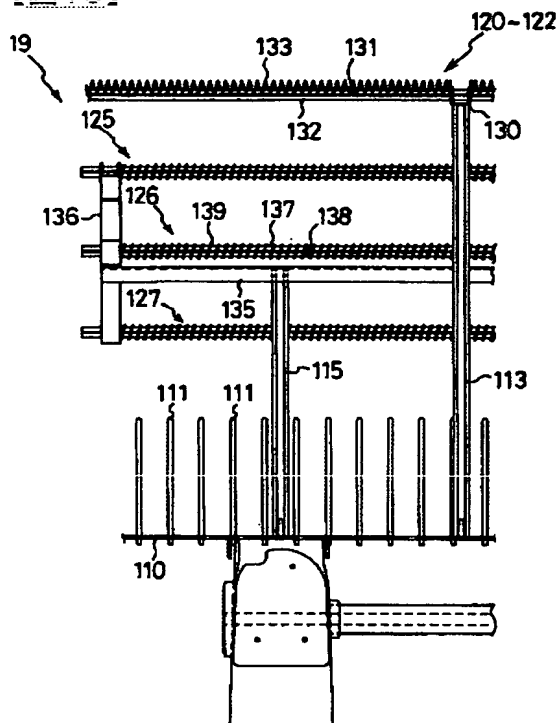
【図14】



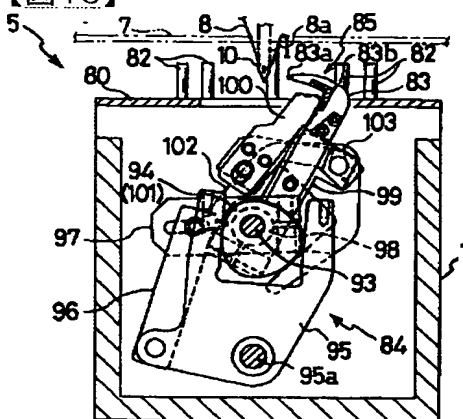
【図11】



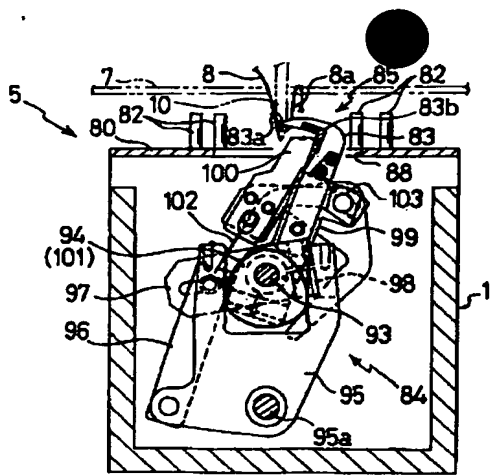
【図15】



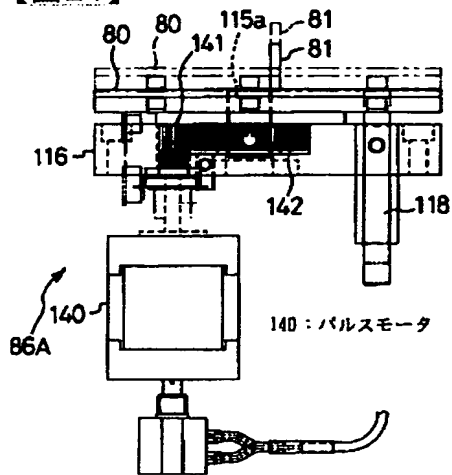
【図16】



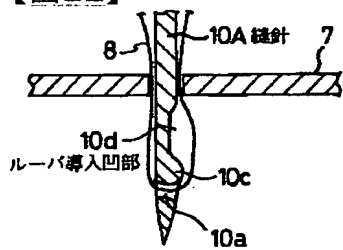
【図17】



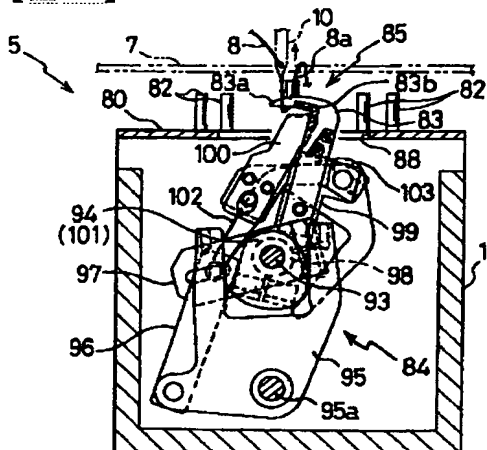
【図21】



【図22】



【図18】



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CLAIMS

[Claim(s)]

[Claim 1] It sets to the tuft sewing machine which can form many yarn loop formations by collaboration with the sewing needle which moves up and down to the base fabric supported by the throat-plate bottom, and the looper which catches the yarn prolonged from this sewing needle. The tuft sewing machine characterized by having two or more needle bars equipped with the sewing needle, respectively, the needle-bar case which supports these needle bars, and the needle-bar change device which switches alternatively the needle bar as which the migration drive of the needle-bar case was carried out, and it was chosen from two or more needle bars to said looper and a corresponding operating location.

[Claim 2] It is the tuft sewing machine according to claim 1 which establishes the loop disconnect device which cuts many yarn loop formations and forms many cut piles, and is characterized by constituting this loop disconnect device so that that yarn loop formation may be cut, whenever it forms one yarn loop formation.

[Claim 3] The tuft sewing machine according to claim 2 characterized by establishing the height centering-control device in which the height location of said throat plate can be adjusted, changing the distance of a throat plate and the thread cutter step of a looper according to this height centering-control device, and adjusting the die length of a cut pile.

[Claim 4] Said height centering-control device is a tuft sewing machine according to claim 3 characterized by constituting so that it may have a manual dial and a throat plate may be moved up and down by actuation of the manual dial.

[Claim 5] Said height centering-control device is a tuft sewing machine according to claim 3 which is equipped with the actuator which can vertical drive a throat plate, carries out drive control of this actuator based on tuft encaustic formation data, and is characterized by moving a throat plate up and down.

[Claim 6] A tuft sewing machine given in any 1 term of claims 1-5 characterized by preparing the attachment component which holds near the edge of the yarn prolonged from two or more sewing needles under pause among said two or more sewing needles respectively possible [discharge].

[Claim 7] A tuft sewing machine given in any 1 term of claims 1-6 characterized by pinching yarn according to a yarn pinching device to the timing to which a looper catches the yarn which establishes the yarn pinching device pinched possible [release of the section] in the middle of the yarn prolonged in two or more sewing needles from two or more yarn sources of supply, respectively, and is prolonged from said sewing needle, and abbreviation coincidence.

[Claim 8] A tuft sewing machine given in any 1 term of claims 1-7 characterized by forming in the top part of the needle hole of each sewing needle the looper installation crevice along which it passes in case a looper catches yarn.

[Translation done.]

* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention uses the yarn of two or more versatility with which thread colors etc. differ about a tuft sewing machine, and relates to the tuft sewing machine which enabled formation of tuft patterns various to a base fabric.

[0002]

[Description of the Prior Art] The conventional tuft sewing machine is equipped with the looper which catches the yarn which a rocking drive is fundamentally carried out synchronizing with the sewing needle by which a vertical drive is carried out, and the sewing needle moving up and down, and is prolonged from the sewing needle, and many yarn loop formations are formed in the base fabric bottom in which cloth delivery is supported and carried out to the throat-plate bottom by collaboration of these sewing needles and a looper. Furthermore, many of conventional tuft sewing machines establish the loop disconnect device containing a looper, of this loop disconnect device, many yarn loop formations are cut and many cut piles are formed.

[0003] As a conventional tuft sewing machine, practical use is presented [the sewing needle] with the tuft sewing machine of two or more multi-needle type for the tuft sewing machine of an one single needle type, and the sewing needle. The common tuft sewing machine of a multi-needle type can be equipped with two or more sewing needles which intersect perpendicularly with the feed direction of a base fabric and which were installed horizontally, and two or more loopers corresponding to these sewing needles, and can form a yarn loop formation (cut pile) in the base fabric by which cloth delivery is carried out all at once in a certain width of face (width of face which installed two or more sewing needles).

[0004] As a tuft sewing machine of other multi-needle types, JP,6-35701,B is equipped with two or more sewing needles by which a vertical drive is carried out independently, and two or more loopers corresponding to these sewing needles, two or more unique yarn is used, and the tuft sewing machine whose formation of the various tuft patterns which become a base fabric from many cut piles was enabled is indicated.

[0005] two or more needle holders with which this tuft sewing machine was equipped with the sewing needle, respectively, and these needle holder -- the upper and lower sides -- with the attachment component held movable The common moving-part material arranged by two or more needle holders in the shape of contiguity, and the vertical drive which carries out the vertical drive of this moving-part material, The linkage which consists of two or more air cylinders which connect two or more needle holders with moving-part material respectively possible [a deconcatenation], the level drive which intersects perpendicularly an attachment component and moving-part material with the feed direction of a base fabric and which carries out a migration drive horizontally are formed.

[0006] A vertical drive is carried out, and the sewing needle (needle holder) by which the needle holder equipped with the selected sewing needle was connected with the vertical good dynamic body by the air cylinder, and was connected with it with moving-part material with the vertical drive in this condition collaborates with a corresponding looper, and forms a yarn loop formation. If a migration drive is carried out to horizontally to which a yarn loop formation (cut pile) will be formed in the cloth feed direction in that case if a base fabric is sent, and an attachment component and a

cloth feed direction and moving-part material cross at right angles with a level drive, a yarn loop formation will be formed in the cloth delivery rectangular cross direction. In addition, if a sewing needle is moved in the cloth delivery rectangular cross direction in order to form a yarn loop formation, it is necessary to also move the looper corresponding to the sewing needle in this direction.

[0007] Moreover, in a common tuft sewing machine, when forming a cut pile, whenever a base fabric is sent and it newly catches one yarn loop formation in the condition that the looper has caught two or more yarn loop formations (three [for example,]), the looper and lower knife of a loop disconnect device cut the yarn loop formation first caught while being caught by the looper, and a cut pile is formed. In addition, whenever it forms one yarn loop formation in JP,5-222660,A, the technique in which a loop disconnect device cuts the yarn loop formation is indicated, but since preparing by making a looper and a knife into a group for every one sewing needle of that is shown when forming two or more sewing needles, equipment becomes on a large scale and complicated.

[0008] In adjusting the die length of a cut pile conventionally, it is carrying out by changing the fitting location of the looper fixed to moving-part material with the stop screw etc., and changing the distance of a throat plate and the thread cutter step of a looper. On the other hand, by the air cylinder, the cam to which a cam side contacts the inferior surface of tongue of a throat plate is rotated to JP,52-74455,A, a throat plate is moved up and down to it, the distance of a throat plate and the thread cutter step of a looper is changed at it, and the technique of adjusting the die length of a cut pile is indicated.

[0009] On the other hand, in the condition that two or more sewing needles are carrying out a drive halt, to JP,1-57177,B, the section is put in block in the middle of two or more yarn prolonged to two or more sewing needles, respectively, it grasps possible [release] to it with the yarn grasping implement driven by the air cylinder, and the technique with which it was made for the cut pile of the point of these yarn not to escape from a base fabric is indicated.

[0010] In addition, in a common multi-needle type sewing machine, there is much what prepared attachment components, such as two or more clips which hold two or more needle threads prolonged from two or more sewing needles, respectively. On the other hand, the coil spring densely rolled as one attachment component instead of two or more attachment components is prepared at the multi-needle type sewing machine of JP,5-253377,A, and the technique of making this coil spring pinching two or more needle threads, respectively is indicated.

[0011] Here, if formation actuation of a yarn loop formation and a cut pile is explained, in the condition that a sewing needle is pierced in a base fabric from the bottom, and the needle hole is located in the base fabric bottom, a looper will be introduced between the top part of the needle hole of a sewing needle, and yarn, and yarn will be caught. if moderate tension is given by the drive of a sewing needle, where a yarn loop formation and a cut pile stop having loomed in the top-face side of a moderate tightening **** base fabric and a yarn loop formation is stretched with a pin, a loop disconnect device can cut certainly, and a cut pile can be formed.

[0012]

[Problem(s) to be Solved by the Invention] By the tuft sewing machine of a single needle type, when forming the tuft pattern of two or more colors, it is necessary to do a troublesome and complicated yarn exchange activity for every color substitute of the yarn to be used. That is, since the workload for yarn exchange becomes large and working capacity falls remarkably, it is difficult absolutely to form various tuft patterns easily. By the common tuft sewing machine of a multi-needle type, two or more sewing needles can be equipped with unique yarn, and the tuft pattern of two or more colors can be formed. However, although it is effective when forming yarn loop formations (cut pile) all at once in a certain width of face since the vertical drive of two or more sewing needles is carried out in one, it is difficult to form various tuft patterns easily.

[0013] Although various tuft patterns can be formed by the tuft sewing machine of the multi-needle type of JP,6-35701,B, in order to have to prepare the looper for a number of a sewing needle, and the air cylinder of a linkage, components mark increase and structure is complicated. And large-sized moving-part material common to two or more sewing needles must be prepared, and the vertical drive containing the large-sized actuator which carries out the vertical drive of the moving-part material must be formed. Furthermore, when the sewing needle to be used moves in the cloth

delivery rectangular cross direction, the device in which the looper corresponding to the sewing needle is moved in this direction must also be established. Consequently, the manufacture cost of a tuft sewing machine becomes very expensive, and, on the whole, a tuft sewing machine is enlarged. [0014] When forming a cut pile, in the condition that the looper has caught two or more yarn loop formations Whenever a base fabric is sent and it newly catches one yarn loop formation, in what is performed by cutting the yarn loop formation first caught while being caught by the looper There are problems, like that a looper is enlarged, that a base fabric can be sent only in the fixed direction, that the delivery pitch of a base fabric cannot be changed, and a limit is further imposed also on a feed rate. So, of course, it is difficult to form various tuft patterns in a base fabric easily using this technique.

[0015] When adjusting the die length of a cut pile, it is troublesome in order to have to perform fixed discharge of moving-part material, and immobilization after fitting location modification, and it difficult to fine-adjust the fitting location of moving-part material what is performed by changing the fitting location of the looper fixed to moving-part material with the stop screw etc. Although the height location of a throat plate is changed and the die length of a cut pile is adjusted with the technique of JP,52-74455,A, in order to carry out the vertical drive of the throat plate by the air cylinder, it is difficult to adjust a throat plate in a desired height location, and, of course, it is difficult also for fine-adjusting the height location of a throat plate.

[0016] When the independent drive of two or more sewing needles is carried out, it stops functioning with the technique of JP,1-57177,B, although a grasping member grasps the section possible [release] in package to two or more sewing needles in the middle of two or more yarn prolonged, respectively and functions to them in the condition that two or more sewing needles are carrying out a drive halt, since the vertical drive of two or more sewing needles is carried out in one. In addition, in a common multi-needle type sewing machine, by some which prepared attachment components, such as two or more clips which hold two or more needle threads, respectively, components mark increase, those anchoring becomes serious, and there is a possibility that two or more needle threads can be stabilized and cannot be pinched to a coil spring, with the technique of JP,5-253377,A.

[0017] Since the yarn of about the same size as woolen yarn is used, there is a possibility that a looper may not be introduced between the top part of the needle hole of a sewing needle and yarn and yarn cannot be caught with a looper in that case, it becomes impossible to form a yarn loop formation by the conventional tuft sewing machine. Moreover, in order not to establish the stitch-balancing-thread-tension device for giving tension to the yarn prolonged in a sewing needle from a yarn source of supply especially by the conventional tuft sewing machine etc., Since there is a possibility that yarn may be superfluously sent out to a needle drawer back from a yarn source of supply and moderate tension cannot be given to yarn in that case by vertical movement of a sewing needle, The problem that a yarn loop formation and a cut pile loom in the top-face side of a base fabric, or it becomes impossible to cut a yarn loop formation certainly by the loop disconnect device, and quality deteriorates arises. In addition, a yarn attachment component given in JP,1-57177,B does not give tension to yarn.

[0018] The purposes of this invention are enabling formation of various tuft patterns easily, simplifying structure, realizing positive tuft encaustic formation actuation, etc. in a tuft sewing machine.

[0019]

[Means for Solving the Problem] The tuft sewing machine of claim 1 is set to the tuft sewing machine which can form many yarn loop formations by collaboration with the sewing needle which moves up and down to the base fabric supported by the throat-plate bottom, and the looper which catches the yarn prolonged from this sewing needle. A sewing needle is characterized by having two or more needle bars with which it was equipped, respectively, the needle-bar case which supports these needle bars, and the needle-bar change device which switches alternatively the needle bar as which the migration drive of the needle-bar case was carried out, and it was chosen from two or more needle bars to said looper and a corresponding operating location.

[0020] Two or more needle bars equipped with the sewing needle, respectively are supported by the needle-bar case, the migration drive of the needle-bar case is carried out by the needle-bar change device, and the needle bar chosen from two or more needle bars is alternatively switched to an

operating location. The needle bar and looper of an operating location drive after the needle-bar change by the needle-bar change device, the yarn prolonged from the sewing needle which moves up and down with the needle bar is caught by the looper, and a yarn loop formation is formed in the base fabric bottom by which is supported by the throat-plate bottom and cloth delivery is carried out to it. In addition, by preparing a looper cutting machine style, a yarn loop formation can be cut and a cut pile can be formed.

[0021] By establishing said two or more needle bars, a needle-bar case, and a needle-bar change device, it can be used being able to equip two or more sewing needles with two or more kinds of yarn with which thread colors etc. differ, and can switch to the yarn of the request (chosen) used for a degree from the yarn used among the yarn of these two or more classes now (chosen) easily a needle bar and the whole sewing needle. That is, since it becomes unnecessary to do a troublesome and complicated yarn exchange activity for every color substitute of the yarn to be used, the workload for yarn exchange can be mitigated and working capacity can be raised.

[0022] And it becomes possible by performing delivery actuation of a base fabric, transfer operation of the needle bar by the needle-bar change device, yarn loop-formation formation actuation by the needle bar (sewing needle) and looper of an operating location, etc. with various setting patterns to form easily the various tuft patterns which become a base fabric from many yarn loop formations and cut piles. and increase of components mark is suppressed and easy in structure, in order for what is necessary just to be to form the needle-bar drive which carries out the vertical drive only of the one needle bar of an operating location moreover that what is necessary is just to form one looper common to them to two or more sewing needles (needle bar) -- and it can miniaturize and becomes advantageous in manufacture cost.

[0023] Whenever the tuft sewing machine of claim 2 establishes the loop disconnect device which cuts many yarn loop formations and forms many cut piles in invention of claim 1 and this loop disconnect device forms one yarn loop formation, it is characterized by being constituted so that that yarn loop formation may be cut. A yarn looper and a cut pile can be formed with delivery at the rate of a request freely [base fabric] in an arbitration pitch in the direction of arbitration, without being restrained by the yarn loop formation caught by the looper. That is, it becomes very effective when forming various tuft patterns in a base fabric.

[0024] The tuft sewing machine of claim 3 is characterized by establishing the height centering-control device in which the height location of said throat plate can be adjusted, changing the distance of a throat plate and the thread cutter step of a looper according to this height centering-control device, and adjusting the die length of a cut pile in invention of claim 2. The die length of a cut pile can be adjusted easily and it becomes possible to form easily the tuft pattern which becomes a base fabric from the cut pile of various die length.

[0025] The tuft sewing machine of claim 4 is characterized by constituting said height centering-control device so that it may have a manual dial and a throat plate may be moved up and down by actuation of the manual dial in invention of claim 3. By actuation of a manual dial, the height location of a throat plate, i.e., the die length of a cut pile, can be adjusted easily. Moreover, while enabling accommodation of a height location on a stepless story for a throat plate, it can make it possible to perform the fine adjustment simply.

[0026] In invention of claim 3, said height centering-control device is equipped with the actuator which can vertical drive a throat plate, and the tuft sewing machine of claim 5 carries out drive control of this actuator based on tuft encaustic formation data, and is characterized by moving a throat plate up and down. Drive control of the actuator can be carried out based on tuft encaustic formation data, and the height location of a throat plate can be adjusted automatically. That is, since formation actuation of the tuft pattern which consists of a cut pile of various die length can be performed continuously, productivity improves.

[0027] The tuft sewing machine of claim 6 is characterized by preparing the attachment component which holds near the edge of the yarn prolonged from two or more sewing needles under pause among said two or more sewing needles respectively possible [discharge] in invention of any 1 term of claims 1-5. Since near the edge of the yarn prolonged from two or more sewing needles under pause can be held to an attachment component, respectively, it can prevent that near the edge of these yarn twines or it is interfered.

[0028] In invention of any 1 term of claims 1-6, the tuft sewing machine of claim 7 establishes the yarn pinching device pinched possible [release of the section] in the middle of the yarn prolonged in two or more sewing needles from two or more yarn sources of supply, respectively, and is characterized by pinching yarn according to a yarn pinching device to the timing to which a looper catches the yarn prolonged from said sewing needle, and abbreviation coincidence. By vertical movement of a sewing needle, it can prevent that yarn is superfluously sent out to a needle drawer back from a yarn source of supply.

[0029] The tuft sewing machine of claim 8 is characterized by forming in the top part of the needle hole of each sewing needle the looper installation crevice along which it passes in case a looper catches yarn in invention of any 1 term of claims 1-7. Even when thick yarn is used especially, yarn is certainly caught by the loop formation introduced into a loop-formation installation crevice, and a yarn loop formation can be formed.

[0030]

[Embodiment of the Invention] Hereafter, it explains, referring to a drawing about the gestalt of operation of this invention. Forming yarn loop-formation 8a in a base fabric 7, as shown in drawing 19, this operation gestalt is an example at the time of cutting the yarn loop-formation 8a, forming cut pile 8b, and applying this invention to the tuft sewing machine which can form a tuft pattern, as shown in drawing 20.

[0031] As shown in drawing 1, the tuft sewing machine TM is equipped with the yarn feeder 19 grade prepared in the head unit [which was prepared in the body section / which consists of the bed section 1, the pedestal section 2, and the arm section 3 / of sewing machine, and front end section side of the arm section 3] 4, bed section unit [which was prepared in the front end section of the bed section 1] 5, and pedestal section 2 and arm section 3 bottom.

[0032] First, the head unit 4 is explained. As shown in drawing 1 - drawing 6, to the head unit 4 the needle bar 11 of plurality (7 [for example,]) equipped with the sewing needle 10, respectively, and two or more needle bars 11 -- respectively -- the upper and lower sides -- with the needle-bar case 12 supported movable Two or more pairs (for example, seven pairs) of thread-guard members 13 and 14 corresponding to two or more needle bars 11, The needle-bar change device 15 which switches alternatively one needle bar 11 which carried out the migration drive of the needle-bar case 12 at the longitudinal direction, and was chosen from two or more needle bars 11 to the looper 83 of the bed section unit 5, and a corresponding operating location, The principal part of the needle-bar drive 16 which carries out the vertical drive of the needle bar 11 of an operating location etc. is prepared.

[0033] The needle-bar case 12 was formed in the abbreviation rectangle in front view, two or more needle bars 11 were installed in the interior of this needle-bar case 12 by the longitudinal direction side by side in the shape of a single tier, and the sewing needle 10 with which the lower limit section of each needle bar 11 was equipped has projected them to the case body 12 down side. The thread-guard members 13 and 14 of one pair of upper and lower sides corresponding to each needle bar 11 were connected with the needle bar 11 fixed, and are projected from the vertical slit 20 of the needle-bar case 14 to the front.

[0034] The connection member 21 which jutted out the upper part of the needle-bar case 12 over the backside, and was further jutted out over the lower part to the backside is being fixed. The slide rail 22 long to the right and left fixed to the lower part of the connection member 21 engages with the engagement member 23 fixed to the front-end bottom of the arm section 3 free [sliding] from the bottom, the bracket 24 fixed to the back-end section of the connection member 21 is attached outside the right and left fixed to the arm section 3 bottom by the long rod 25 free [sliding], and the guide support of the needle-bar case 12 is carried out movable to a longitudinal direction at the arm section 3.

[0035] In the migration field of two or more needle bars 11 moved to a longitudinal direction, the location (this is an operating location and there is usually in the center of the cross direction of the arm section 3) in which a vertical drive is possible is set up by the below-mentioned needle-bar drive 16 only in one needle bar 11 among two or more needle bars 11 with a needle-bar case 12, and the device which switches alternatively the needle bar 11 chosen as this operating location from two or more needle bars 11 is a needle-bar change device 15.

[0036] The electric motor 30 fixed to the backside [the connection member 21 of immobilization in

the needle-bar case 12] by the arm section 3 as this needle-bar change device 15 was shown in drawing 5 and drawing 6 , It is prepared in the cam 31 by which a rotation drive is carried out with an electric motor 30 at the circumference of the axial center of a longitudinal direction, the spiral slot 32 formed in the periphery section of a cam 31, and the needle-bar case 12 fixed, and has the koro 33 of the plurality (for example, nine pieces) which can engage with the spiral slot 31. If a cam 31 fixes in the shape of outside attachment on the rotation shaft 34 and an electric motor 30 drives, the rotation drive of the cam 31 will be carried out in one with the rotation shaft 34 through the gear 35 of fixing to the output shaft of an electric motor 30, and the gear 36 of fixing on the rotation shaft 34.

[0037] The long lamina perpendicularis 37 is fixed to the backside [the connection member 21] by right and left, two or more koro 33 is arranged at equal intervals at a longitudinal direction, and the backside [this lamina perpendicularis 37] is equipped with it free [rotation] at the circumference of an antero-posterior-axis alignment, respectively. It is constituted as always engaged with the spiral slot 32 in at least one in two or more koro 33. If the rotation drive of the cam 31 is carried out, at least one koro 33 which engages with the spiral slot 32 will be guided, and the migration drive of the needle-bar case 12 will be carried out through a lamina perpendicularis 37 and the connection member 21 to a longitudinal direction with the koro 33. And a proximity switch etc. can detect the location of the needle-bar case 12, and two or more needle bars 11 can be alternatively switched to an operating location.

[0038] The arm shaft horizontal 40 supported by the machine frame free [rotation] through bearing 40a prepared in the interior of the arm section 3 at the cross-direction sense as the needle-bar drive 16 was shown in drawing 5 , The crank lever 42 by which the end section was connected with the front end section of an arm shaft horizontal 40 rotatable in the shape of eccentricity through the crank attachment member 41, It has the vertical good dynamic body 45 with which the radical needle bar 43 and the radical needle bar 43 of the vertical prepared in the before [the crank lever 42] side fixed were attached outside, and it was guided in the vertical direction, and the other end of the crank lever 42 was connected.

[0039] the vertical good dynamic body 45 -- relativity -- it has the 1st and 2nd moving-part material 46 and 47 connected pivotable, and the edge of the crank lever 42 is connected with the lower 1st moving-part material 46 rotatable. If the rotation drive of the arm shaft horizontal 40 is carried out by the sewing-machine motor, through crank movement of the crank lever 42, the vertical good dynamic body 45 will be guided at the radical needle bar 43, and a both-way drive will be carried out up and down. beak-like engagement section 47a which usually turns to the front at the 2nd moving-part material 47 -- preparing -- the engagement pin 48 which projects back is formed in each needle bar 11 fixed. Engagement section 47a can engage with the engagement pin 48 of the needle bar 11 of an operating location, and where the engagement pin 48 and engagement section 47a are engaged, if the needle-bar drive 16 operates, the both-way drive of one pair of thread-guard members 13 and 14 connected with the vertical good dynamic body 45 fixed in one at a needle bar 11 and it will be carried out up and down.

[0040] Each needle bar 11 carries out sheathing of the compression-spring 11a, and elastic energization is carried out upwards by the compression-spring 11a. So, the needle bar 11 to which the engagement pin 48 is not engaging with engagement section 47a of the vertical good dynamic body 45 is always located in a needle top location. When the vertical good dynamic body 45 is an upper limit location, the engagement section 47a becomes the height location in which the engagement pin 48 of the needle bar 11 of a needle top location and engagement are possible.

[0041] The vertical good dynamic body 45 in the condition that you made it located in an upper limit location that is, according to the needle-bar change device 15 If the needle bar 11 which carried out the migration drive of the needle-bar case 12, and was chosen from two or more needle bars 11 is alternatively switched to an operating location The engagement pin 48 of the needle bar 11 of the operating location can carry out engagement connection at engagement section 47a of the vertical good dynamic body 45, and can carry out the vertical drive of the needle bar 11 of an operating location with the needle-bar drive 16.

[0042] Here, when stopping the needle bar 11 and one pair of thread-guard members 13 and 14 by which the vertical drive is carried out with the needle-bar drive 16, even if it carries out a drive halt,

the needle-bar balance jump device 49 for canceling connection to the needle-bar drive 16 and needle bar 11 which operate by inertia in an instant, and stopping the vertical drive is established. This needle-bar balance jump device 49 by having a solenoid actuator and rotating the 2nd moving-part material 47 more than a predetermined include angle (for example, 90 degrees) with that solenoid actuator While canceling engagement at engagement section 47a of the 2nd moving-part material 47, and the engagement pin 48 of a needle bar 11 and intercepting the power transfer to a needle bar 11 from the needle-bar drive 16 A needle top location is made to jump a needle bar 11 with one pair of thread-guard members 13 and 14 according to the elastic energization force of compression-spring 11a.

[0043] As shown in drawing 2 - drawing 4 , two or more tension-thread-guard members 50-53 are formed in the front-face side of the needle-bar case 12 fixed, and after carrying out the thread guard of each yarn 8 prolonged from the yarn feeder 19 to the order of the tension-thread-guard member 50, the thread-guard member 13, the tension-thread-guard member 51, the tension-thread-guard member 52, the thread-guard member 14, and the tension-thread-guard member 53, it is led to a sewing needle 10.

[0044] By the way, the attachment component 70 which holds near the edge of balance equipment 60, the yarn pinching device 65 pinched possible [release of the section] in the middle of the yarn 8 prolonged in two or more sewing needles 10, respectively from two or more yarn dies 9 (yarn source of supply) of the yarn feeder 19, and the yarn 8 prolonged from two or more sewing needles 10 under pause among two or more sewing needles 10 respectively possible [discharge] is formed in the needle-bar case 12.

[0045] The thread-guard member of one pair of upper and lower sides fixed to each needle bar 11 as balance equipment 60 was shown in drawing 2 - drawing 4 (the top thread-guard member 13 and bottom thread-guard member 14), The tension-thread-guard member of one pair of upper and lower sides prepared in the needle-bar case 12 which is a needle-bar base material fixed (the bottom fixed tension-thread-guard member 51 and bottom fixed tension-thread-guard member 52), It has the yarn pinching device 61 for balances pinched possible [release of the section] in the middle of two or more yarn 8 prolonged from the bottom fixed tension-thread-guard member 51 to the bottom fixed tension-thread-guard member 52.

[0046] The tension-thread-guard sections of the front end of the fixed tension-thread-guard members 51 and 52 are located in the same order location, the tension-thread-guard sections of the front end of the thread-guard members 13 and 14 are located in the same order location, and the tension-thread-guard section of the fixed tension-thread-guard members 51 and 52 is located in a front [section / of the thread-guard members 13 and 14 / tension-thread-guard] side. The condition that drawing 2 has the thread-guard members 13 and 14 (needle bar 11) in an upper limit location is shown, and drawing 3 shows the condition that the thread-guard members 13 and 14 are in a minimum location. As shown in these drawings, it is constituted so that the tension-thread-guard section of the bottom fixed tension-thread-guard member 51 may be located near the mid gear between the vertical migration fields of the top thread-guard member 13 and the tension-thread-guard section of the bottom fixed tension-thread-guard member 52 may be located near the lower limit location between the vertical migration fields of the bottom thread-guard member 14.

[0047] The yarn pinching device 61 for balances has the solenoid actuator 64 formed in the strip-like fixed side pinching member 62 long to the right and left prepared in the front end section of bracket 62a fixed to the needle-bar case 12, the movable side pinching member 63 arranged in the before [the fixed side pinching member 62] side, and the left-hand side of the needle-bar case 12 fixed through adapter plate 64a. both the pinching members 62 and 63 -- the needle-bar case 12 and abbreviation -- it has the same right-and-left length, and two or more yarn 8 prolonged from the bottom fixed tension-thread-guard member 51 to the bottom fixed tension-thread-guard member 52 is running along between both the pinching members 62 and 63.

[0048] The movable side pinching member 63 has press Itabe 63a which can press yarn 8 to the fixed side pinching member 62, press Itabe 63a, and connection Itabe 63b really formed in the shape of a rectangular cross. The right end part of connection Itabe 63b is crooked, it is supported pivotably by the flank of the needle-bar case 12, and the left end section of connection Itabe 63b is connected with the solenoid actuator 64. The rocking drive of the movable side pinching member 63

is carried out by the solenoid actuator 64, and pinching actuation which pinches the section by both the pinching members 62 and 63 in the middle of the yarn 8 prolonged from the bottom fixed tension-thread-guard member 51 to the bottom fixed tension-thread-guard member 52, and release actuation to release can be performed. In addition, the member made of rubber may be attached and at least one side of the front section of the fixed side pinching member 62 and the rear-face section of the movable side pinching member 63 may be constituted.

[0049] The yarn pinching device 65 has the strip-like fixed side pinching member 66 (for example, it consists of a member made of rubber) long to the right and left fixed to the front face of the upper part of the tension-thread-guard member 53, the movable side pinching member 67 arranged in the before [the fixed side pinching member 66] side, and the solenoid actuator 68 formed fixed on the left-hand side of the needle-bar case 12, as shown in drawing 2 - drawing 4 , and drawing 7 . both the pinching members 66 and 67 -- the needle-bar case 12 and abbreviation -- it has the same right-and-left length, and two or more yarn 8 which results to the tension-thread-guard member 53 is running along between both the pinching members 66 and 67.

[0050] The movable side pinching member 67 has press Itabe 67a which can press yarn 8 to the fixed side pinching member 66, press Itabe 67a, and connection Itabe 67b really formed in the shape of a rectangular cross. The right end part of connection Itabe 67b is crooked, it is supported pivotably by the flank of the needle-bar case 12, and the left end section of connection Itabe 67b is connected with the solenoid actuator 68.

[0051] If the rocking drive of the movable side pinching member 67 is carried out by the solenoid actuator 68 and both the pinching member 66 and the yarn 8 between 67 are released, the free delivery of the yarn 8 to a sewing needle 10 will be attained, and if the yarn 8 between both the pinching members 67 is held, the free delivery of the yarn 8 to a sewing needle 10 will become impossible. To establishing two or more yarn pinching devices in which it corresponds to two or more yarn 8, since it can consider as the yarn pinching device 65 common to two or more yarn 8, structure is simplified and it becomes advantageous in manufacture cost.

[0052] Here, based on drawing 8 , actuation of the yarn pinching device 61 for balances of balance equipment 60 over vertical movement of a sewing needle 10 and the lower yarn pinching device 65 is explained.

[0053] In the yarn pinching device 61 for balances, while the sewing needle 10 is descending from near an upper limit location, it is in a pinching condition, if a sewing needle 10 reaches near a minimum location, it will switch to a release condition, next if a sewing needle 10 reaches near an upper limit location, it will switch to a pinching condition again. Thus, balance equipment 60 is synchronized with vertical movement of a sewing needle 10 (needle bar 11). It is constituted so that the pinching actuation which pinches the section in the middle of the yarn prolonged to the tension-thread-guard section of the bottom fixed tension-thread-guard member 52, and the release actuation to release may be repeated and may be performed from the tension-thread-guard section of the bottom fixed tension-thread-guard member 51. By this It becomes possible to ensure moderate delivery of the yarn 8 by the top thread-guard member 13, and the moderate tightening of yarn loop-formation 8a by the bottom thread-guard member 14.

[0054] In the lower yarn pinching device 65, while the sewing needle 10 is descending from near an upper limit location, it is in a pinching condition, if a sewing needle 10 arrives at the throat-plate 80 neighborhood, it will switch to a pinching condition, next if a sewing needle 10 reaches near a minimum location, it will switch to a pinching condition again. This pinching is not performed fixed so that migration of yarn 8 may become impossible, and it is performed in the form which gives suitable resistance to yarn 8 so that the crash of yarn may be prevented. Thus, it is made to synchronize with vertical movement of a sewing needle 10 (needle bar 11), and since yarn 8 is pinched to the timing and abbreviation coincidence to which a looper 83 catches the yarn 8 especially prolonged from the sewing needle 10 of a minimum location, it can prevent that yarn 8 is superfluously sent out to a needle drawer back.

[0055] As shown in drawing 2 - drawing 4 , and drawing 7 , the long yarn maintenance plates 71 and 72 are fixed to right and left in the shape of close, and an attachment component 70 is constituted, is arranged in a before [the tension-thread-guard member 53] side with a vertical posture in the yarn pinching device 65 bottom, and is being fixed by two or more screw members 73. The yarn

maintenance plate 71 by the side of before consists of a flat spring, and it has piece of yarn presser foot 71a of plurality (seven [for example,]) corresponding to two or more sewing needles 10. The yarn maintenance plate 72 on the backside is formed in a rectangle, and the Johan section of two or more piece of yarn presser foot 71a touches the front face of this yarn maintenance plate 72.

[0056] In making near the edge of the yarn 8 prolonged from a sewing needle 10 in an attachment component 70 hold, the edge of yarn 8 is held and it raises near the edge of yarn 8 upwards along the rear face of the inferior-surface-of-tongue section of piece of yarn presser foot 71a. Then, it shows around at piece of yarn presser foot 71a, and through the slight elastic deformation of piece of yarn presser foot 71a, near the edge of yarn 8 is inserted between piece of yarn presser foot 71a, and the yarn maintenance plate 72, and pinching maintenance is carried out. When canceling maintenance of the yarn 8 to an attachment component 70, it can carry out easily by holding the edge of yarn 8 and pulling below.

[0057] In comparison with the conventional thing which prepared attachment components, such as two or more clips holding near the edge of two or more yarn 18, components mark can be reduced, attachment becomes easy, and since structure is also simplified, manufacture cost can be reduced. Moreover, according to the various yarn with which sizes etc. differ, by making piece of yarn presser foot 71a transform, since yarn holding power can be adjusted easily, it excels also in versatility. Since it was easy to insert yarn 8 between piece of yarn presser foot 71a, and the yarn maintenance plate 72 since piece of yarn presser foot 71a had turned to the direction of slant, and two or more piece of yarn presser foot 71a of all has turned to the same direction, yarn maintenance of all the yarn 8 can be carried out in the same actuation as the yarn attachment component 70. In addition, it is also possible to omit the thread-guard plate 72 on the backside, instead to substitute for the vertical section of the tension-thread-guard member 53.

[0058] In addition, as shown in the needle-bar case 12 at drawing 2 and drawing 3, the cloth presser foot 75 of the shape of a ring which is arranged in the needle-bar 11 bottom of an operating location, is interlocked with vertical movement of a needle bar 11, and performs predetermined vertical motion is formed, and the yarn cutting machine style which has the cutting member 76 from which the yarn 8 of the sewing needle 10 with which the needle bar 11 of an operating location was equipped on the occasion of a needle-bar change is cut is prepared in the arm section 3.

[0059] Next, the bed section unit 5 is explained. As shown in drawing 9 - drawing 12, to the bed section unit 5 The pins 81 and 82 of the plurality (8 [for example,]) for being set up by a throat plate 80 and the throat plate 80, and carrying out ***** order of the cut pile 8b of a large number [finishing / formation to a base fabric 7] by delivery of a base fabric 7, The looper 83 for catching the yarn 8 prolonged from the sewing needle 10 moving up and down, and forming yarn loop-formation 8a, The height centering-control device 86 grade which can adjust the looper drive 84 which drives a looper 83, the loop disconnect device 85 which cuts yarn loop-formation 8a and forms cut pile 8b, and the height location of a throat plate 80 is prepared.

[0060] As shown in drawing 9 and drawing 11, a throat plate 80 is constituted from plane view by the rectangle, and the long rectangle hole 88 is formed in right and left for a while rather than the center section at the backside. the looper 83 from the rectangle hole 88, and lower knife 100 of the loop disconnect device 85 the upper limit section turned the prehension crookedness of a projection and the upper limit section of a looper 83 up to the left -- prehension section 83a formation of is done, and cutting-edge 83b is formed in the end face section of the prehension section 83a as a thread cutter step.

[0061] Eight pins 81 and 82 contain two cloth presser-foot pins 81 which are prepared the cloth presser foot 75 and in the shape of opposite, and pinch a base fabric 7 with the cloth presser foot 75. The two cloth presser-foot pins 81 In the longitudinal-direction mid gear of the rectangle hole 88, it is prepared forward and backward on both sides of the rectangle hole 88, and as remaining six pins 82 become non-denses in the circumference of the rectangle hole 88, they are prepared in order and right and left at the abbreviation symmetry.

[0062] As shown in drawing 12, the upper limit section of the cloth presser-foot pin 81 is in a location higher than a looper 83, and the upper limit section of pins 82 other than cloth presser-foot pin 81 is in a location higher than cutting-edge 83b of the looper 83 at the time of cutting yarn loop-formation 8a. Among two or more pins 81 and 82, the height of the cloth presser-foot pin 81 is

higher than the other pins 82, thereby, a base fabric 7 is supported by the upper limit section of the cloth presser-foot pin 81 in a throat-plate 80 top, and pinching of a base fabric 7 of it is attained by the cloth presser-foot pin 81 and cloth presser foot 75.

[0063] the lower shaft 90 by which the looper drive 84 is synchronized with an arm shaft horizontal 40 by the sewing-machine motor, and a rotation drive is carried out as shown in drawing 10 - drawing 12 , the driving shaft 93 in which a rotation drive is carried out by rotation of a lower shaft 90 through gears 91 and 92, the cam 94 by which was prepared in the throat-plate 80 bottom and interlocking connection was carried out, and two forks -- it has 95, a link 96, the color connection member 97, a color 98, and the looper foundation 99, and the looper 83 is attached in the looper foundation 99.

[0064] the two forks which outside attachment fixing of the cam 94 was carried out at the driving shaft 93, and were supported pivotably by the cam 94 at pivotable support shaft 95a -- 95 is being engaged. Two crotches 95 and the color connection member 97 are connected by the link 96, outside attachment fixing of this color connection member 97 is carried out at the color 98 attached outside by the driving shaft 93 free [rotation], and outside attachment fixing also of the looper foundation 99 is carried out at the same color 98. And by this looper drive 84, if the rotation drive of the cam 94 is carried out 1 round in the direction of an arrow head (refer to drawing 12) with a driving shaft 93, 1 round-trip rocking drive of the looper 83 will be carried out at right and left.

[0065] the cam 101 by which the loop disconnect device 85 was formed in a lower shaft 90 and a driving shaft 93 common to the looper drive 84, and the throat-plate 80 bottom, and interlocking connection was carried out, and two forks -- 102 and Metz foundation 103 It has. cam 101 outside attachment fixing is carried out at a driving shaft 93 -- having -- the cam 101 two forks -- 102 it is engaged -- having -- the two forks -- 102 Metz foundation 103 interlocking connection is carried out -- having -- a driving shaft 93 -- cam 101 if a rotation drive is carried out 1 round in the direction of an arrow head -- lower knife 100 One **** is driven.

[0066] The height centering-control device 86 is a manual dial 115, as shown in drawing 13 . It has and is the manual dial 115. Actuation constitutes so that two or more pins 81 and 82 may be moved up and down with a throat plate 80. Namely, two or more longitudinal-to throat plate 80 guide rod 117,118 The upper limit section is fixed and they are these guide rods 117,118. Throat-plate base material 116 of the lower part of a throat plate 80 It is guided in the shape of insertion. Manual dial 115 Screw 115a by which interlocking connection was carried out is screwed in a throat plate 80, and, thereby, it is a manual dial 115. Screw 115a also rotates by making it rotate, and a throat plate 80 moves up and down. The distance of the upper limit section of the cloth presser-foot pin 81 and cutting-edge 83b of a looper 83 which support a throat plate 80 7, i.e., a base fabric, can be changed by this, and the die length of cut pile 8b can be adjusted.

[0067] Here, as shown in drawing 14 , looper installation crevice 10b along which it passes in case a looper 83 catches yarn 8 is formed in the top part of needle hole 10a of each sewing needle 10. The needle diameter of each sewing needle 10 is thick usable in thick yarn 8, and notching **** looper installation crevice 10a is deeply formed greatly in the top part of needle hole 10a of the sewing needle 10. In addition, although the illustration abbreviation was carried out, the base fabric 7 is formed in the cloth delivery device in which cloth delivery is possible by this tuft sewing machine TM to the horizontal direction of arbitration, and that cloth delivery device is constituted by the device in which a base fabric 7 is sent so that the top face of the cloth presser-foot pin 81 may be made to carry out abbreviation contact, through the moving-part material which equipped with the base fabric 7 free [attachment and detachment].

[0068] Next, the yarn feeder 19 is explained. As shown in drawing 1 and drawing 15 , it is the installation plate 110 which can lay a yarn die 9 in the pedestal section 2 and arm section 3 bottom. It is fixed and is this installation plate 110. Two or more set-up ***** 111 It is equipped with two or more yarn dies 9. Installation plate 110 In a posterior part, it is the cylindrical member 112. It is set up and is the cylindrical member 112. Three yarn guides 120-122 located in a line forward and backward It is connected fixed. moreover, installation plate 110 Another cylindrical member 115 to an anterior part side it sets up -- having -- the cylindrical member 115 Yarn guide 120 from -- 3 yarn guides 125-127 located in a line in the direction of slant suitable for the needle-bar case 12 It is connected.

[0069] Yarn guide 120-122 Two or more connection members 130 of the sense before and after having been the same structure as abbreviation, having been common to these and carrying out predetermined spacing ***** arrangement at right and left While being connected, they are one pair of rod part material 131,132 of the longitudinal-direction sense, respectively. Coil 133 It has. Each yarn guide 120-122 It sets and is the upper rod part material 131. Coil 133 As it inserts in, it is both the rod part material 131,132. Coil 133 It is pinched and is these rod part material 131,132 in this condition. Connection member 130 It is supported in the shape of insertion. The yarn 8 prolonged upwards from each yarn die 9 is three yarn guides 120-122. A thread guard is carried out using one [suitable], and it is a coil 133 about yarn 8 in that case. It sets between the coils of a suitable location and is the rod part material 131. It hangs and is the yarn guide 125. It leads to a side. In addition, it is a coil 133 about yarn 8. You may equip, as it lets it pass.

[0070] Each yarn guide 125-127 Two or more connection members 136 of the slanting sense by which was the same structure as abbreviation, and was common to these and predetermined spacing ***** arrangement was carried out at right and left While being connected, they are one pair of rod part material 137,138 of the longitudinal-direction sense, respectively. Coil 139 It has. In addition, two or more connection members 136 Right and left long level connection member 135 It minds and is the cylindrical member 115. It is connected. Each yarn guide 125-127 It sets and they are both rod part material 137,138. Coil 139 It inserts in and supports and is the rod part material 137,138. Connection member 136 It is supported in the shape of insertion. Said three yarn guides 120-122 The yarn 8 prolonged from one is the yarn guide 125,126,127. It is hung in order and is each yarn guide 125-127 in that case. It sets and is a coil 133 about yarn 8. It sets in a suitable location and is both the rod part material 131,132. It hangs so that it may let it pass in between, and it leads to the tension-thread-guard member 50 of the needle-bar case 12.

[0071] An operation and effectiveness of the above-mentioned tuft sewing machine TM are explained. Two or more needle bars 11 equipped with the sewing needle 10, respectively are supported by the needle-bar case 12 Uichi Hidari seriate, the migration drive of the needle-bar case 12 is carried out by the needle-bar change device 15 at a longitudinal direction, and the needle bar 11 chosen from two or more needle bars 11 is alternatively switched to an operating location. The needle bar 11 switched to the operating location is connected with the needle-bar drive 15 by engagement to the connection pin 48 and engagement section 47a.

[0072] Next, if a sewing-machine motor drives, while the vertical drive of the needle bar 11 of an operating location will be carried out by the needle-bar drive 15 While a looper 83 drives with the looper drive 84 and a driving shaft 93 is carried out one revolution, as shown in drawing 12 , drawing 1616 - drawing 18 Press down in a throat-plate top and yarn loop-formation 8a is formed in the base fabric 7 by which is supported by the pin 81 and cloth delivery is carried out. Furthermore, it is a lower knife 100 in a looper 83 by the loop disconnect device 85. It drives. Much cut pile 8b is formed in a base fabric 7 by repeating the actuation which the yarn loop-formation 8a is cut following formation of yarn loop-formation 8a, and one cut pile 8b is formed, and forms one cut pile 8b at a time in this way, and performing it.

[0073] That is, it can be used, being able to equip two or more sewing needles 10 with two or more kinds of yarn 8 with which thread colors etc. differ. Since it can switch to the yarn 8 of the request (chosen) used for a degree from the yarn 8 used among the yarn 8 of these two or more classes now (chosen) easily a needle bar 11 and the whole sewing needle 10, Since it becomes unnecessary to do a troublesome and complicated yarn exchange activity for every color substitute of the yarn 8 to be used, the workload for yarn exchange can be mitigated and working capacity can be raised. Moreover, it becomes possible to send at the rate of a request in an arbitration pitch in the direction of arbitration freely [without being restrained by yarn loop-formation caught by looper 83 since it constituted so that yarn loop-formation 8a might be cut whenever it forms one yarn loop-formation 8a, and cut pile 8b might be formed 8b / base fabric / 7] in a horizontal plane.

[0074] And delivery actuation of a base fabric 7, the transfer operation of the needle bar 11 by the needle-bar change device 15, the needle bar 11 (sewing needle 10) of an operating location and the yarn loop-formation formation actuation by the looper 83, and a looper 83 and a lower knife 100 It becomes possible by performing cut pile formation actuation etc. with various setting patterns to form easily the various tuft patterns which become a base fabric from much cut pile 8 a. and increase

of components mark is suppressed and easy in structure, in order for what is necessary just to be to form the needle-bar drive 16 which carries out the vertical drive only of the one needle bar 11 of an operating location moreover that what is necessary is just to form one looper 83 common to them to two or more sewing needles 10 (needle bar 11) -- and it can miniaturize and becomes advantageous in manufacture cost.

[0075] Since the height centering-control device 86 in which the height location of the cloth presser-foot pin 81 which supports a throat plate 80 7, i.e., a base fabric, could be adjusted was established, distance with cutting-edge 83b of the looper 83 at the time of this height centering-control device 86 cutting a throat plate 80 and yarn 8 can be changed, and the die length of cut pile 8b can be adjusted easily. And the height centering-control device 86 is a manual dial 115. It has and is the manual dial 115. It can be made to move certainly up and down that it is also at easy structure about the throat plate 80 which carried out screwing connection by actuation with rotating screw 115a. And while enabling accommodation of the height location of a throat plate 80 on a stepless story, the fine adjustment can also be performed easily.

[0076] Since the attachment component 70 which holds near the edge of the yarn 8 prolonged from two or more sewing needles 10 under pause among two or more sewing needles 10 respectively possible [discharge] was formed, it can prevent that the yarn prolonged from two or more sewing needles 10 under pause twines, or it is interfered.

[0077] The yarn pinching device 65 pinched possible [release of the section] in the middle of the yarn 8 prolonged in two or more sewing needles 10 from two or more yarn dies 9, respectively is established, and since yarn 8 is pinched according to the yarn pinching device 65 to the timing and abbreviation coincidence to which a looper 83 catches the yarn 8 prolonged from a sewing needle 10, it can prevent that yarn 8 is superfluously sent out to the needle drawer back of the sewing needle 10 moving up and down.

[0078] In addition, as shown in drawing 21 , it sets in said height centering-control device 86, and it is a manual dial 115. It omits, for example, is a pulse motor 140. It is good also as height centering-control device 86A which it had. At this height centering-control device 86A, it is a pulse motor 140. It is fixed to the throat-plate 80 bottom by longitude, and is that pulse motor 140. Gear 141 of fixing to an output shaft Gear 142 of outside attachment fixing to screw member 115a It has geared.

[0079] And this pulse motor 140 Drive control is carried out based on tuft encaustic formation data, it is constituted so that a throat plate 80 may be moved up and down, and since formation actuation of the tuft pattern which consists of cut pile 8b of various die length can be performed continuously by this, productivity improves. In addition, pulse motor 140 The actuator of an except may constitute so that the height location of a throat plate 80 may be adjusted.

[0080] Moreover, it is good also as sewing needle 10A in which 10d of looper installation crevices along which it passes in case height 10c by which only very few dimensions than the side face of **** project the top part of needle hole 10a to the side to the notching **** part down side with ***** more shallowly than the case of said sewing needle 10 is formed instead of said sewing needle 10 and a looper 83 catches yarn 8, as shown in drawing 22 was formed. 10d of looper installation crevices can be formed in the sewing needle 10 which is not thereby not much thick comparatively greatly at slight depth. Moreover, although not illustrated, **** of a sewing needle may be made a little thicker, and a notch and the height which projects to the side like said height 10c may be deeply formed in the bottom part for the top part of the needle hole of the sewing needle. It becomes effective when forming the loop-formation installation crevice at the time of using thereby more thick yarn 8.

[0081] In addition, it is the range which does not deviate from the meaning of this invention, and it is also possible to carry out with the gestalt which added various modification to said operation gestalt.

[0082]

[Effect of the Invention] Two or more needle bars which were equipped with the sewing needle, respectively according to the tuft sewing machine of claim 1, Since the needle-bar change device which switches alternatively the needle bar which carried out the migration drive of the needle-bar case and needle-bar case which support these needle bars, and was chosen from two or more needle bars to a looper and a corresponding operating location was established A thread color etc. can equip with and use two or more kinds of yarn for two or more sewing needles, and it can switch to the yarn

of the request used for a degree from the yarn used among the yarn of these two or more classes now easily a needle bar and the whole sewing needle. That is, since it becomes unnecessary to do a troublesome and complicated yarn exchange activity for every color substitute of the yarn to be used, the workload for yarn exchange can be mitigated and working capacity can be raised.

[0083] Delivery actuation of a base fabric, the transfer operation of the needle bar by the needle-bar change device, the yarn loop-formation formation actuation by the needle bar and looper of an operating location, etc. by making it perform with various setting patterns It becomes possible to form easily the various tuft patterns which become a base fabric from many yarn loop formations and cut piles. and increase of components mark is suppressed and easy in structure, in order for what is necessary just to be to form the needle-bar drive which carries out the vertical drive only of the one needle bar of an operating location moreover that what is necessary is just to form one looper common to them to two or more sewing needles -- and it can miniaturize and becomes advantageous in manufacture cost.

[0084] Since according to the tuft sewing machine of claim 2 the yarn loop formation is cut according to a loop disconnect device whenever it forms one yarn loop formation, a yarn looper and a cut pile can be formed with delivery at the rate of a request freely [base fabric] in an arbitration pitch in the direction of arbitration, without being restrained by the yarn loop formation caught by the looper. That is, it becomes very effective when forming various tuft patterns in a base fabric.

[0085] According to the tuft sewing machine of claim 3, according to the height centering-control device in which the height location of a throat plate can be adjusted, a throat plate, the thread cutter step of a looper, and distance can be changed, and the die length of a cut pile can be adjusted easily. It becomes possible to form easily the tuft pattern which becomes a base fabric from the cut pile of various die length.

[0086] According to the tuft sewing machine of claim 4, a throat plate is moved up and down by actuation of the manual dial prepared in the height centering-control device, and the height location of a throat plate, i.e., the die length of a cut pile, can be adjusted easily. Moreover, while enabling accommodation of a height location on a stepless story for a throat plate, it can make it possible to perform the fine adjustment simply.

[0087] According to the tuft sewing machine of claim 5, based on tuft encaustic formation data, drive control of the actuator formed in the height centering-control device is carried out, a throat plate is moved up and down, the height location can be adjusted automatically, and since formation actuation of the tuft pattern which consists of a cut pile of various die length can be performed continuously, productivity improves.

[0088] Since the attachment component which holds near the edge of the yarn prolonged from two or more sewing needles under pause among two or more sewing needles respectively possible [discharge] was prepared according to the tuft sewing machine of claim 6, it can prevent that near the edge of these yarn twines or it is interfered.

[0089] According to the tuft sewing machine of claim 7, the yarn pinching device pinched possible [release of the section] in the middle of the yarn prolonged in two or more sewing needles from two or more yarn sources of supply, respectively can be established, and it can prevent that yarn is superfluously sent out to them by vertical movement of a sewing needle from a yarn source of supply to a needle drawer back since yarn is pinched to the timing and abbreviation coincidence to which a looper catches the yarn prolonged from said sewing needle according to a yarn pinching device.

[0090] Since the looper installation crevice along which it passes in case a looper catches yarn was formed in the top part of the needle hole of each sewing needle according to the tuft sewing machine of claim 8, even when thick yarn is used especially, yarn can be certainly caught by the loop formation introduced into a loop-formation installation crevice, and a yarn loop formation can be formed.

[Translation done.]

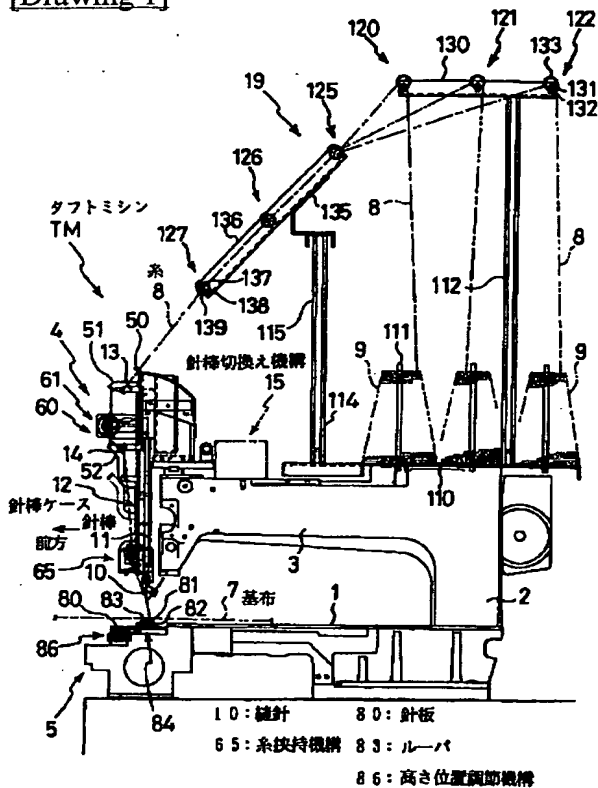
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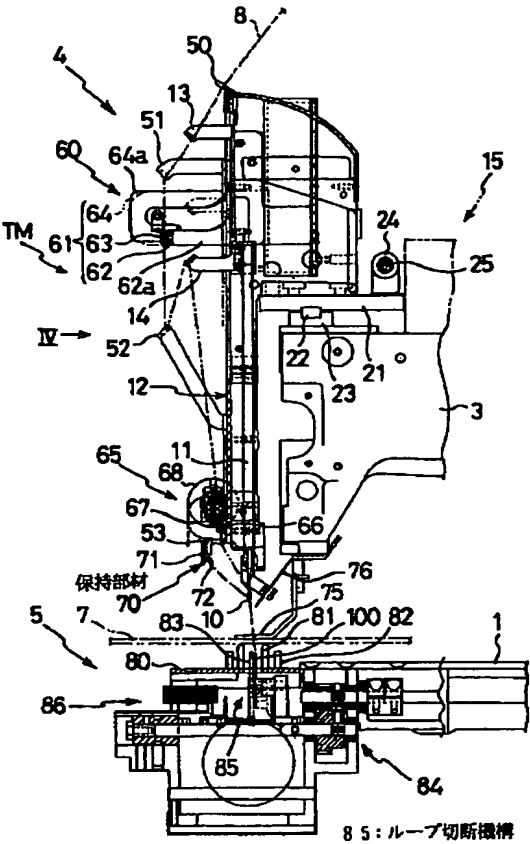
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

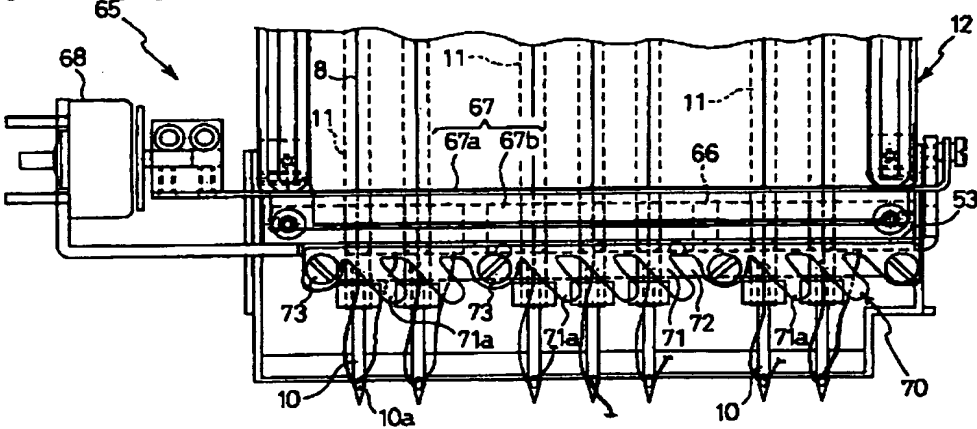
[Drawing 1]



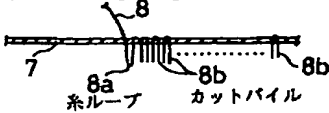
[Drawing 2]



[Drawing 7]



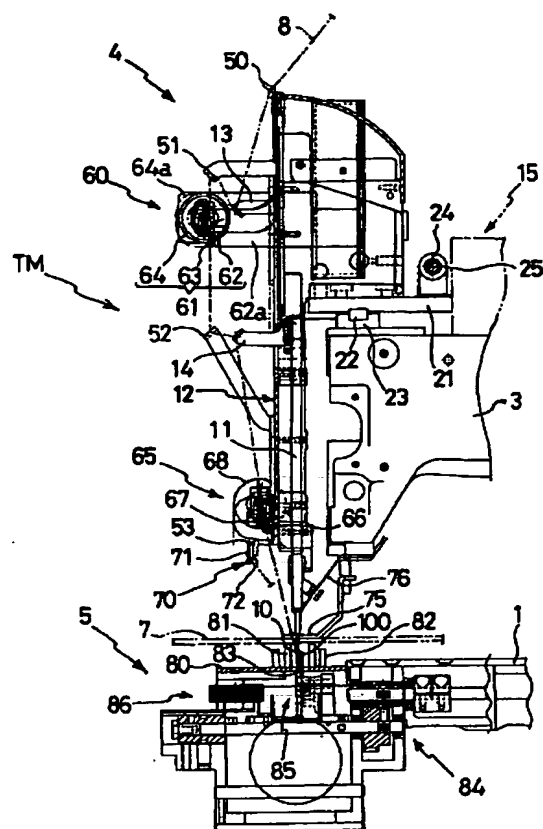
[Drawing 19]



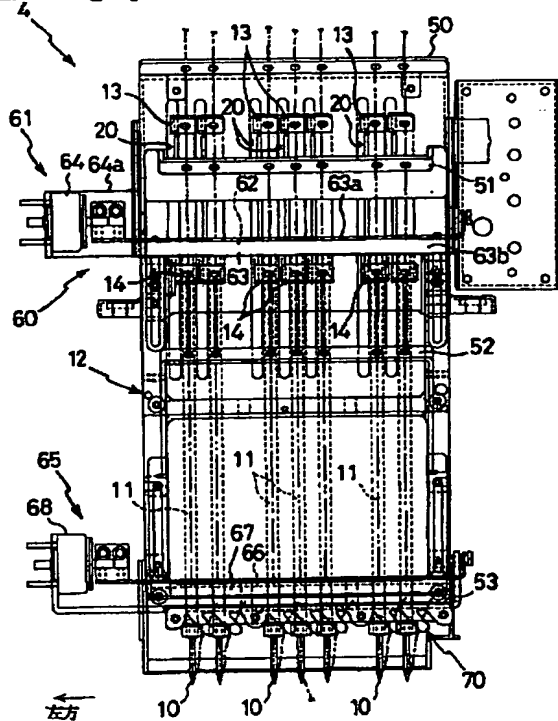
[Drawing 20]



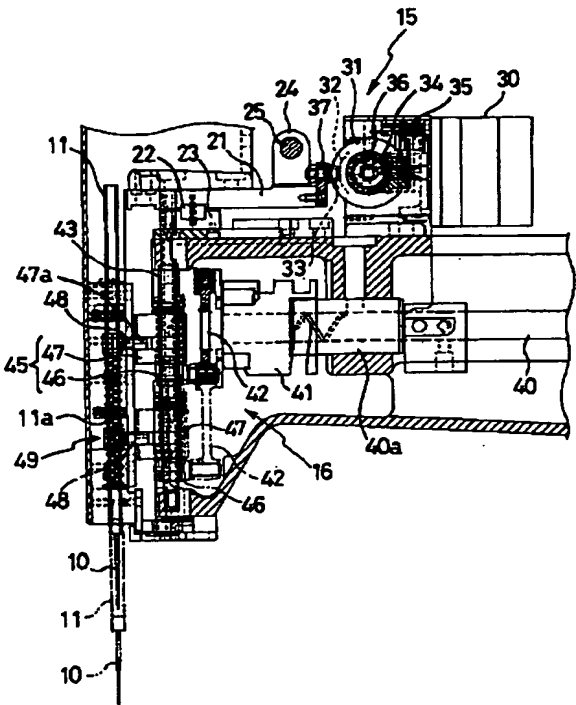
[Drawing 3]



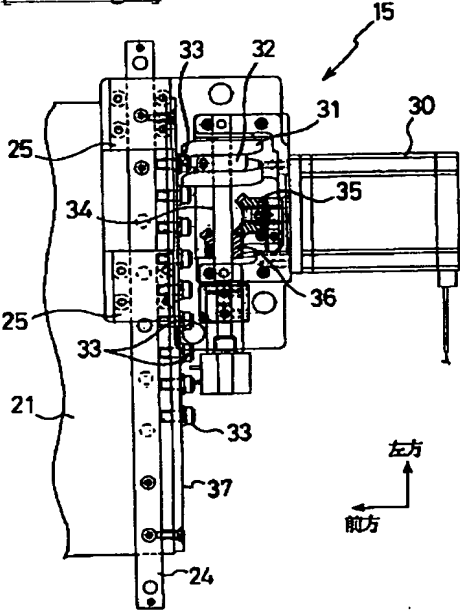
[Drawing 4]



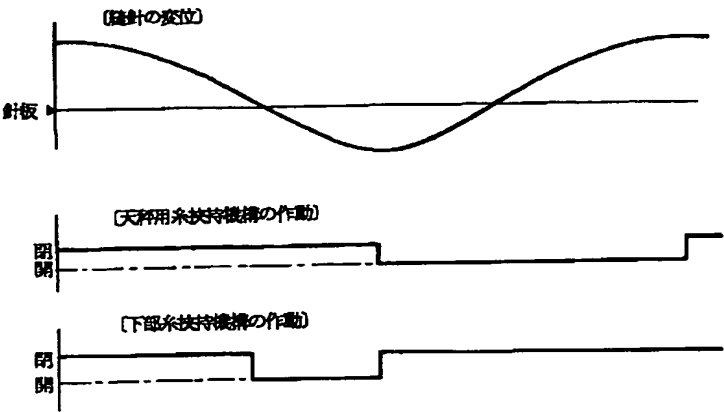
[Drawing 5]



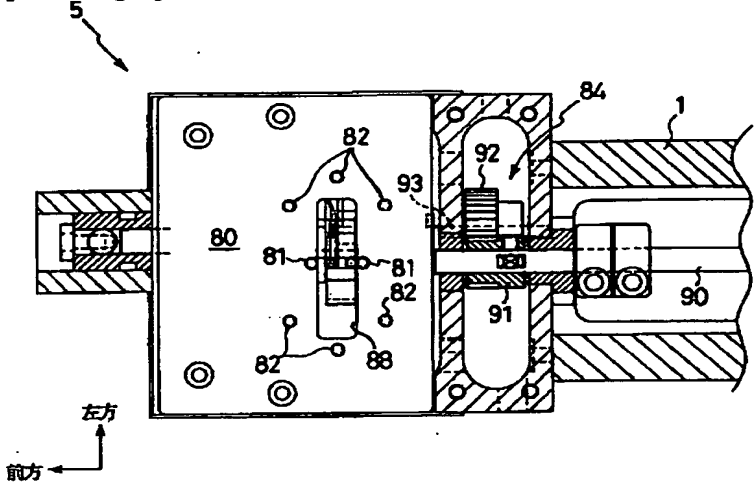
[Drawing 6]



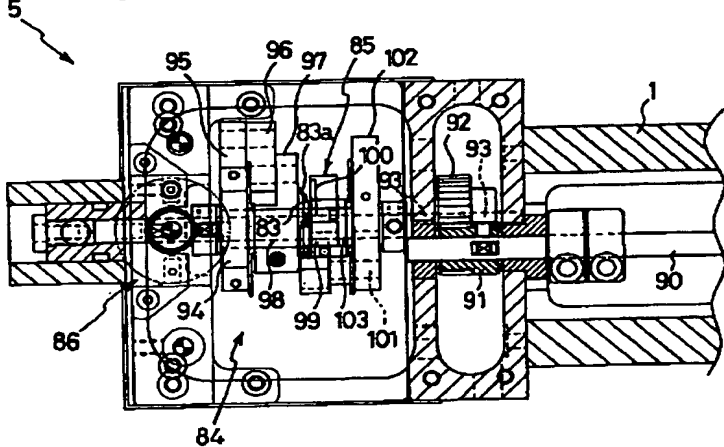
[Drawing 8]



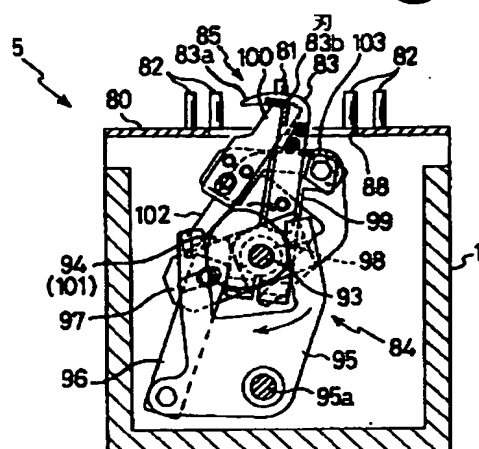
[Drawing 9]



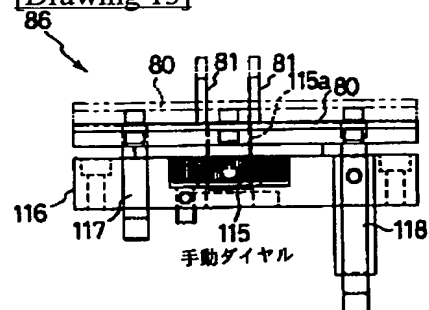
[Drawing 10]



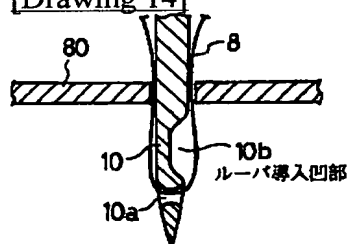
[Drawing 12]



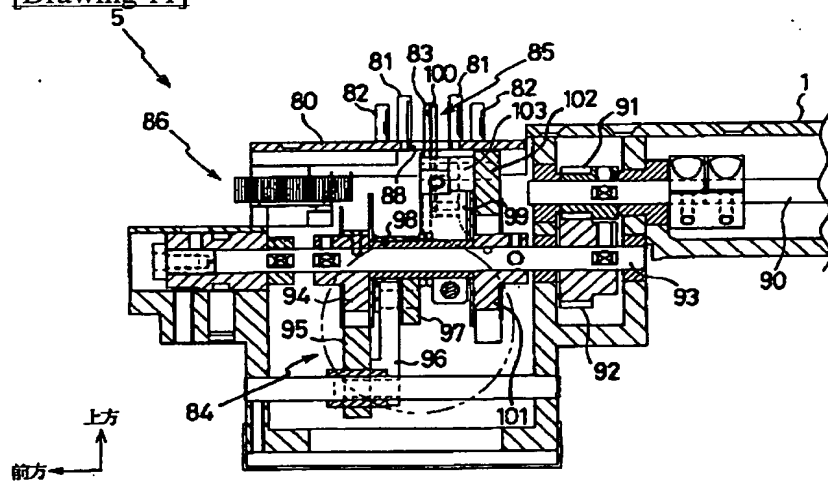
[Drawing 13]



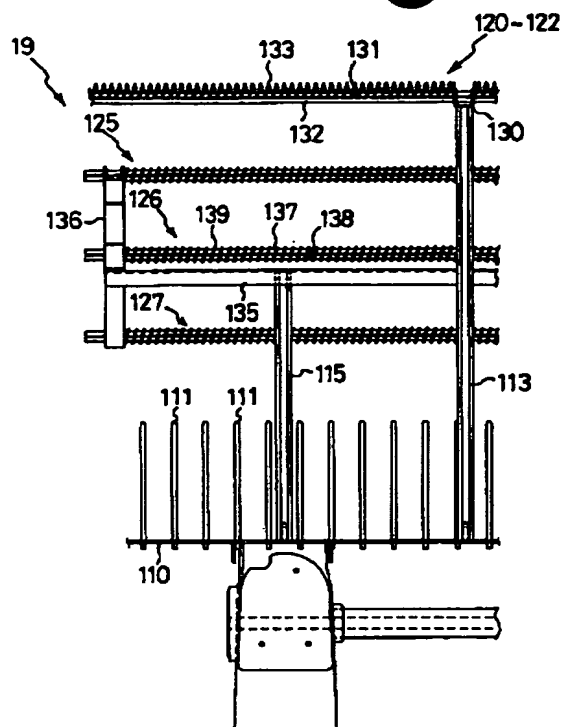
[Drawing 14]



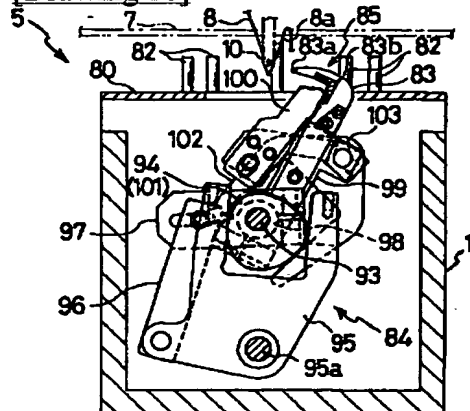
[Drawing 11]



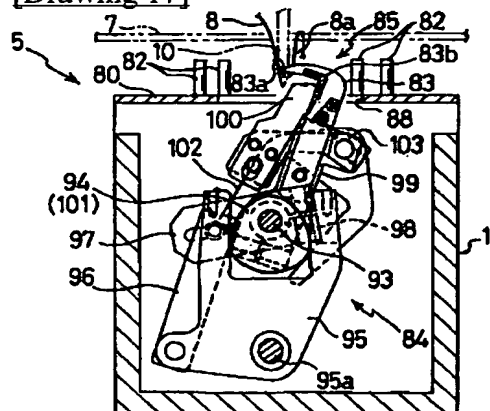
[Drawing 15]



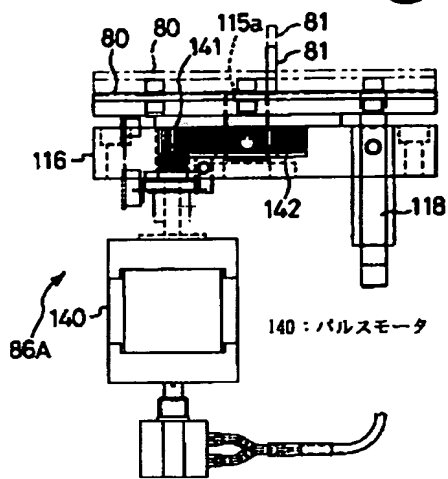
[Drawing 16]



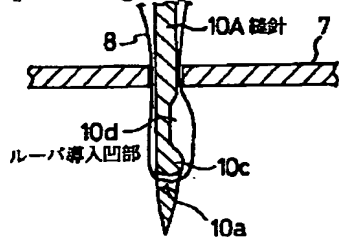
[Drawing 17]



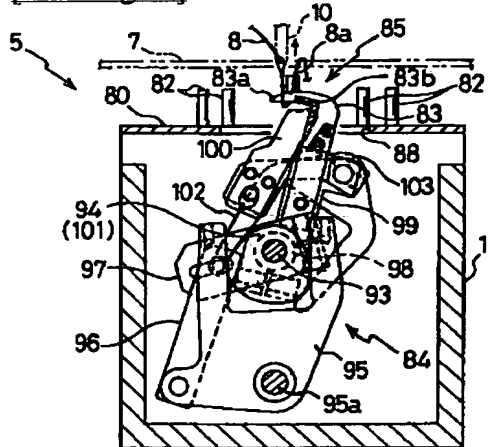
[Drawing 21]



[Drawing 22]



[Drawing 18]



[Translation done.]

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